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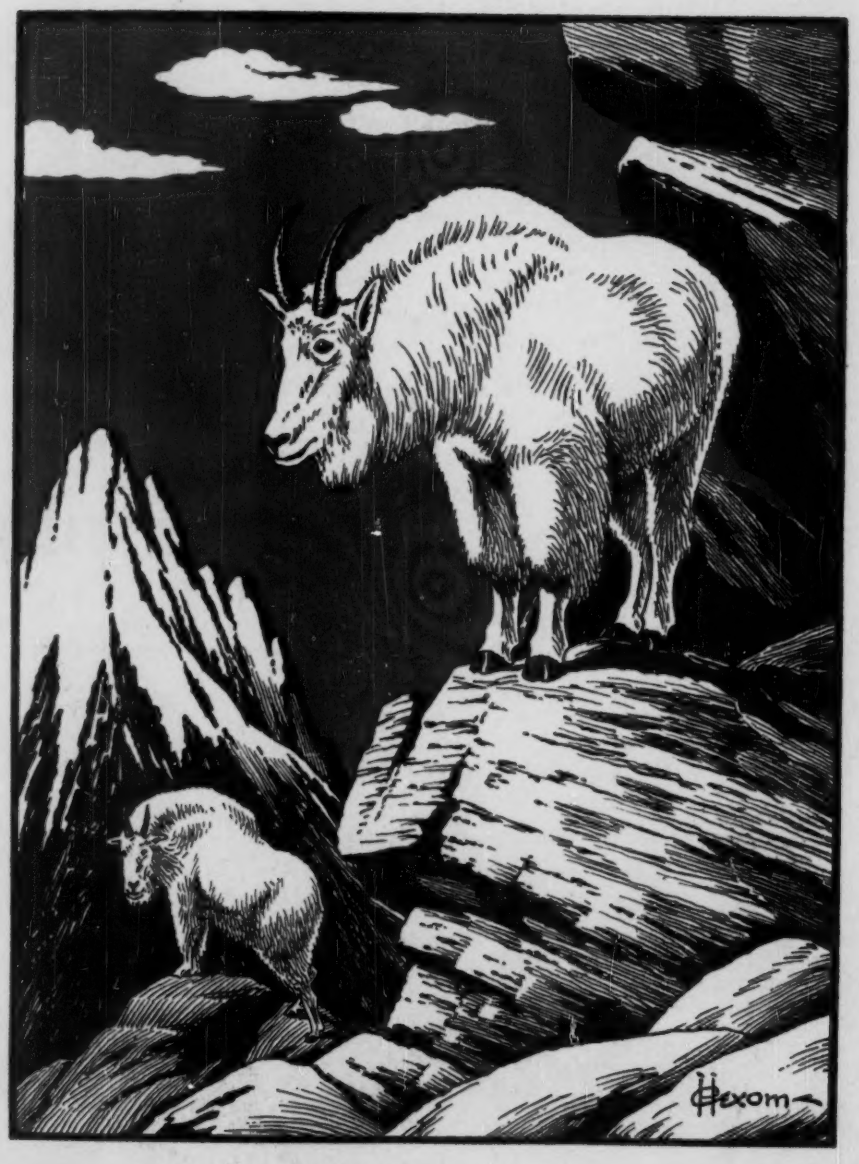

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1958

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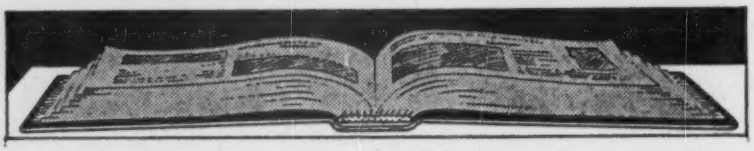

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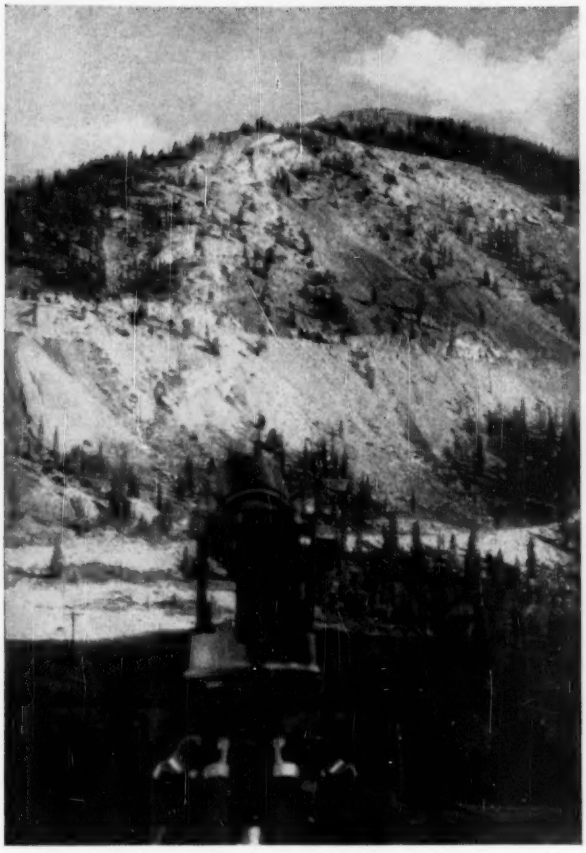

This is the scene as the Hexacon single-lens reflex camera with 50 mm. lens saw it. The cabin is on the skyline of the mountain, one inch from the left margin. Its image on the 35 mm. film is so tiny that it is beyond the resolving power of both lens and film, so no further enlargement is possible. Note how Questar's rotary barrel was used to turn camera for vertical framing of adjacent picture.

This is the mile-distant cabin by direct telescopic photography with Questar. The camera's lens was removed and camera body attached to telescope, close-up view focused on camera groundglass and picture taken. Now the great resolving power of the Questar optics shows cabin on this scale, with enough detail to permit further enlargement to 8 x 10 when fine-grain film is used.

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Anyone can take pictures like the one above at right with any Questar. We went out of our way to take this one as the veriest tyro might—buying film at a small-town drugstore, carrying the exposed film for several summer weeks in a car, and then having it developed and printed by the local photo shop.

Astonishing as this close-up picture of a mile-distant cabin is, it still fails to convey to you what you can see directly with your eye to Questar's ocular. For example, rusty nailheads on the sunlit cabin end were plainly visible, standing out against the tiny cracks of the old weathered boards.

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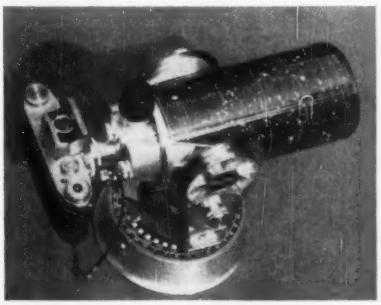

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JUNE-JULY, 1958 VOL. 51 NO. 6

Published by the AMERICAN NATURE ASSOCIATION to stimulate public interest in every phase of nature and the out-of-doors, and devoted to the practical conservation of the great natural resources of America.

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SUBSCRIPTION RATE
NATURE MAGAZINE is published monthly, October to May, inclusive, bimonthly, June to September, inclusive, by the American Nature Association. Entered as second-class matter May 31, 1927, at the post office at Washington, D.C., U. S. A., and accepted for mailing purposes at the special flat rate of postage provided for in the United States Postal Act of October 3, 1917, and February 28, 1925. U.S. and Canada one year, $5; foreign, $.50 extra; two years, $9; life, $100.

Publication and Editorial Office, 1214 16th Street, N. W., Washington 6, D. C. Additional office of publication, Easton, Pa.

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Nature Magazine, past and present, is indexed in The Reader's Guide in your public library.

Reviews

Complete Book of Campfire Programs

By LaRue A. Thurston. New York. 1958. Association Press. 318 pages. Illustrated. $5.95.

This book is directed primarily to the interests of group leaders in Girl and Boy Scout and Campfire Girl work, in summer camps and otherwise where a campfire program fits. This is a most practical book, with details of campfire programs outlined for use as they are, or for adaptation. We would think that this would be a book essential to the library of every camp leader.

Biology Serving You

By Charles Gramet and James Mandel. Englewood Cliffs, N. J. 1958. Prentice-Hall Inc. 616 pages. Illustrated. $4.96.

"This book," the authors say in a preface, "has been designed to meet the challenge of a modern course of study in biology." They have turned out a most interesting and useful book in meeting this challenge. Their text is organized into ten units with the titles Knowing More Livings Things, Basic Structure of Living Things, Man's Use of Biologic Production, Food for Life, The Living Body at Work, Behavior of Living Things, The Fight against Germs, Development of Living Things, Inheritance in Living Things, and The Origins of Living Things. Under these unit headings are forty-three chapters, each unit and chapter organized in terms of concepts and principles that are inductively developed. The authors have used a simple and readable style, and the publishers have provided a most interesting, indeed, exciting, format.

Salt Water Fishes for the Home Aquarium

By Helen Simkatis. Philadelphia. 1958. J. B. Lippincott Company. 254 pages. Illustrated. $6.00.

Tropical fish as a hobby has long been among the leading hobby interests. However, until recently the maintenance of exotic and other marine fishes in the home aquarium has been possible only for those living close to a supply of natural sea water. Now, with the development of artificial salts, the possibilities are vastly extended. It is to such an area of aquarium interest that the author directs her interesting and practical book.

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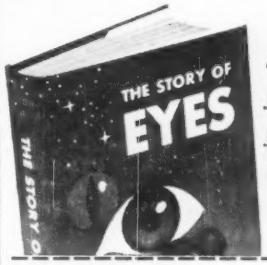

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Nature IN PRINT

By HOWARD ZAHNISER

Living In The Outdoors

ON THE MONDAY BEFORE THE SPRING equinox this year, and on the Monday following, there were published two books as guides to modern ways of living in the wilderness. In the midst of an equinoctial snowfall that made urban and suburban travel seemingly more uncertain even than in the wilderness, and was still swirling in large flakes, making the outdoors of houses, yards, trees, and streets snow covered, I sat at an alcove desk before a window, reading or rereading and thinking about these volumes. A few hours before spring was scheduled to enter quietly in the midst of this snowstorm, I wrote these paragraphs, in anticipation of summer vacations and readers so interested, and in the enjoyment of these handbooks to happiness—*On Your Own in the Wilderness* by Townsend Whelen and Bradford Angier, and *The New Way of the Wilderness* by Calvin Rutstrum.

For the past dozen years it has been my privilege to devote most of my time and energy to service for The Wilderness Society, and to closely related work for other organizations with similar objectives.

In these mid-twentieth-century years, it has seemed startlingly clear that we, as a people, are in danger of losing our areas of wilderness as wilderness, and also our first-hand knowledge and appreciation of wilderness, together with our once rather common skills in wilderness living and travel. At the same time, fortunately I believe, there have also developed a clearer and more widely shared recognition of the values of the wilderness and an awareness of the importance to us as a people, and as individuals, of wilderness experience.

Whether the recognition as to wilderness areas or the awareness regarding wilderness experience should be first in our concern could hardly be determined. They are interrelated. Probably, however, the conservationists involved have been more immediately concerned with the preservation of areas than with the promotion of wilderness activities.

Preservation essential

Certainly this preservation is essential. The threats to the areas being protected have been immediate and definite, and it has been necessary to muster public support to resist projects that would destroy wilderness. Success in such efforts, coupled with awareness that only through public policies deliberately designed to preserve wilderness could such areas be expected to survive the encroachments of our civilization, has most fortunately led to the development and advancement of a basic piece of legislation in the national Congress that promises an enduring program of preservation of some areas.

This measure is well-known in both Senate and House of Representatives as the Wilderness Bill. If those citizens throughout the country who support such a program are immediately articulate, particularly in expressing their support to their Senators and Congressmen, there is a chance that this basically important conservation legislation can be passed this year, despite opposition and inertia.

It *should* pass. Delay in a program designed to deal with the fast-moving forces that destroy wilderness is especially unfortunate, and all of us should lose no time in expressing our earnestness. (So write at once!)

But concern to preserve our areas of wilderness should also be accompanied by an interest in maintaining our personal experience with and in wilderness. The ability to travel the wilderness, the willingness to do so in the face of our multiplying conveniences and our temptations to ease, and the sense of the values, the personal, human values of wilderness experience, are surely also in jeopardy.

Public administrators of areas of wilderness, for example, complain increasingly of difficulties in obtaining rangers who are able and willing to live in the wilderness. These administrators talk urgently, and ominously, of the needs—strictly for administrative use, they say—of facilities and installations that modify the wilderness environment, and if allowed to be developed for recreational and public use, would destroy it. We are indeed in danger of seeing our wilderness skills lost.

Representative John P. Saylor, in an address that by coincidence carried the date of Henry David Thoreau's birthday, two years ago—July 12, 1956—placed these questions dramatically before the Congress.

"Shall we, exploiting all our resources," he asked, "reduce every last bit of our wilderness to roadsides of easy access and areas of convenience, and ourselves soften into an easy-going people deteriorating in luxury and ripening for the hardy conquerors of another century?"

Maintaining our strength

He was advocating then the Wilderness Bill, and he answered his own question with a "hope not" and a declaration that "in our preservation of wilderness and our encouragement of the hardy recreation that puts a man or a woman or a red-blooded child on his own in the face of primitive hardships we can help meet this need for maintaining a nation of strong, healthy citizens."

So one greets these books on wilderness living not only with the excitement that such writings arouse in anticipation and remembrance of the kinds of personal experiences with which they deal, but also with a satisfaction that here are stimulants and guides that will help lead more people into the wilderness, and will help them see that their experiences are safe, confident, and enjoyed.

Even if there were no hope whatever that I should ever have the chance again to visit the wilderness and thus make practical use of such volumes, I could not think of any better reading and musing on a suburban snow-bound, slush-bound day than this.

Any reader of this page, I predict, will find these books thus stimulating, and any reader of Townsend Whelen's "Foreword" to *On Your Own in the Wilderness*, or its Chapter 1 on "Lure of the Trail," is likely to find himself, or herself, inspired to become a practical, planning reader of the rest of the book.

In three opening infectious paragraphs Colonel Whelen suggests a wilderness scene, and then invites:

"Come with us into it. Let us talk together about how to live in it." He describes the experiences through life that have qualified himself and his collaborator, Bradford Angier, as authorities. He points out the need for a guide book, and outlines the volume's purpose.

The writings of George W. Sears (Nessmuk), Horace Kephart, and Henry Thoreau, on which Whelen and Angier have relied, seem to them no longer valid. Although these older writers are "inspirational and revealing," Colonel Whelen believes that they never knew "real, wild, unspoiled country firsthand."

He bases his belief regarding Thoreau on *Walden* alone, apparently, for *The Maine Woods* by Thoreau is indeed an account of real, wild unspoiled country first-hand. It is interesting to note also that Thoreau was an early precursor of Colonel Whelen, Bradford Angier, and Calvin Rutstrum, for he listed in an appendix an "Outfit for an Excursion"—"an excursion of twelve days into the Maine woods in July," an outfit so interesting as almost to tease one into quotation.

Detailed and complete

The helps that Colonel Whelen and his collaborator afford are, however, certainly more detailed and more complete than Thoreau's. One can imagine the interest that Thoreau would have in these volumes and his satisfaction in realizing the many people to whom they would appeal.

Surely Thoreau would appreciate the chapter on "Lure of the Trail."

"A lot of us," says its opening paragraph, "are working harder than we want, at things we don't like to do. Why? In order to afford the sort of existence we don't care to live. If one hears the call of the open places, why shall he not answer it as fully as he may while eyes will never be keener nor stride more lusty?"

The answer will be more intelligent for anyone who has read these guides—or either of them. Which one to choose will be hard to decide—a decision no easier when one realizes that the senior author of one volume has written the foreword for the other one, too.

"Calvin Rutstrum," says Townsend Whelen in his foreword to Rutstrum's *The New Way of the Wilderness*, "is a wilderness voyager who has spent much of his life in truly wild country, in fair weather and foul, in summer and winter. Rutstrum" Colonel Whelen continues, " 'savvies' the bush, and what he tells you in these pages will be a real help to those of you who plan to enter wild country for recreation or for other purposes. He points out in a practical manner the best ways to do things, the easiest way, the way to survive in emergencies, and the way to get real pleasures and benefits that such a life alone can bestow."

Doubtless Calvin Rutstrum would say the same thing about *On Your Own in the Wilderness*. He could.

Either of these volumes will be stimulating and informative. To have both at hand is about as good a fortune for a cozy day indoors during a mid-March snow storm as one might wish. They suggest a spring of anticipation and a thoroughly worthwhile summer vacation.

On Your Own in the Wilderness. By Townsend Whelen and Bradford Angier, with a chapter by Vena Angier on "Women in the Woods." Harrisburg, Pennsylvania: The Stackpole Company. 1958. xii + 324 pp. (6 by 8⅞ in.) with 47 photographs "by the authors," 26 drawings by Vena Angiers, appendix of cooking terms and data, "Where to Write for Fish and Game Laws," and list of outfitters, "Where to Get It." $5.

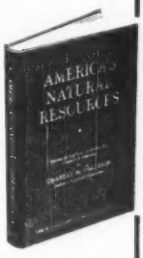
The New Way of the Wilderness. By Calvin Rutstrum. New York: The Macmillan Co. 1958. ix + 276 pp. (5⅛ by 8½ in.), with foreword by Townsend Whelen, 106 drawings by Les Kouba, and index. $4.50.

Pets from the Pond

By Margaret Waring Buck. Nashville, Tenn. Abingdon Press. Illustrated by the author. 72 pages. $3.00.

Ponds and other bodies of fresh water have a special allure for all boys and girls fortunate enough to have such a spot to visit and explore. And such watery places sustain a varied and fascinating wildlife, including small fishes, frogs, turtles, salamanders, toads, crayfish, snails and water insects. Some of these, brought home and properly established in an aquarium, constitute "pets." In this book Miss Buck provides practical information not only about what one may find in ponds and streams but how plants and animals can be maintained under aquarium conditions. This is an excellent book and we do not know of any other similar text.

AMERICA'S NATURAL RESOURCES



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Grace M. Miller

Mrs. Mervin W. (Peggy) Larson, a former teacher, has been writing articles for a number of years, mostly with a Nature interest. She is married to the curator of exhibits of the Arizona-Sonora Desert Museum in Tucson, Arizona. . .Grace M. Miller is an enthusiastic member of one of the country's great non-letter fraternities, the bird watchers, and makes her home near San Francisco, California . . .John and Myra Mehrtens live in Dallas, Texas, a husband and wife team of writers and photographers. Mr. Mehrtens formerly was curator of reptiles at the Columbus and Cleveland, Ohio, zoos, and both husband and wife hope that eventually they may establish a private Nature preserve somewhere in the Southwest. . .Edna Peck Atwood of Avoca, New York, sold her first article to Nature Magazine nearly twenty years ago, and has contributed many stories since then, usually on the subject of entomology. She is also a writer of verse and children's stories. . .Townsend Godsey, veteran of more than two hundred magazine stories and a professional photographer, was at one time director of information and education for the Missouri Conservation Commission. He lives in the Missouri Ozark town of Branson. . .Beulah Woods Allen, of Ponca City, Oklahoma, is a free-lance writer on Nature subjects and a student of bird life. . .Charles R. Kilbourne is a biology teacher at Suitland High School in Suitland, Maryland. . .H. Lou Gibson is on the staff of the Eastman Kodak Company of Rochester, New York, and is president of the Biological Photographic Association, Inc. . .For more than thirty years Weldon F. Heald has been an explorer of the mountains, forests and deserts of the Far West, is a member of many conservation organizations, and an active advocate of the preservation of our finest wilderness areas. His home is in Tucson, Arizona. . .Bernard L. Gordon is a biology instructor at Rhode Island College of Education in Providence.

Reviews

Exploring the Distant Stars

By Clyde B. Clason. New York. 1958. G. P. Putnam's Sons. 384 pages. $5.00.

In his opening chapter the author says that he wrote this book "to prove that astronomy doesn't need to be taken on faith." He started gathering material for it because he was curious as to "why astronomers can claim with perfect self-confidence the truthfulness of such apparently fantastic declarations as the following: 'Vega is 27 light years away'." His curiosity led him on to further exploration of the heavens, and years of such study have resulted in this interesting addition to the astronomical library.

Animal Tails

By George F. Mason. New York. 1958. William Morrow and Co. 94 pages. Illustrated by the author. $2.50.

The tails of animals are distinctive in appearance and significant in purpose. In this little volume they provide the author with material for an interesting book that is a companion publication with his earlier books, which have dealt with animal clothing, tools, weapons, sounds, homes and tracks, and is a worthy companion to its fellow volumes in this informative and interesting series.

Food

By John Boyd Orr. New York. 1958. Doubleday and Company. 69 pages. $3.45.

The full title of this large and colorful book appears to be *The Wonderful World of Food; The Substance of Life.* (The designers of dust jackets often have a way of confusing titles.) The author was the first Director-General of the United Nations Food and Agricultural Organization and a winner of the Nobel Peace Prize. In this book he traces the development of man from the earliest times in terms of his quest for food and he is equally concerned with food itself, how Nature makes it, how man uses it, how science has improved it and the varied problems concerned with its production. Here is a pictorially and textually exciting presentation of a subject that concerns everyone.

Kachina Dolls

By W. Ben Hunt. Milwaukee, Wisconsin. 1958. Milwaukee Public Museum. Illustrated in color and black and white. 32 pages. $1.00.

Hopi Indians make small wooden dolls for their children in order to teach them about Indian gods and spirits and to provide colorful toys. This little book is written for young craftsmen who may wish to carve their own dolls. It contains practical instructions about the entire process, including making a variety of items of adornment.

Briefly Noted

How Does a Garden Grow? By Ann Towson Brown. New York. 1958. E. P. Dutton and Co. 48 pages. Photographs by Peggy Plummer Sanders. $2.50. Introducing the youngster to the wonders and pleasures of a garden.

Snow Tracks. By Jean George. New York. 1958. E. P. Dutton and Co. 62 pages. Illustrated by the author. $2.50. An introductory text for young people about animal tracks.

God Gave Us Seasons. By Carolyn Muller Walcott. Nashville 2, Tenn. 1958. Abingdon Press. Illustrated by Meg Wohlberg. $1.25. Through this simple little book the youngster comes to know and appreciate the seasons.

Penguins on Parade. By Patricia Lauber. New York. 1958. Coward-McCann. 64 pages. Illustrated by Douglas Howland. $3.00. Introducing the younger reader to the story of the various species of the ever-fascinating penguins.

The Call of Life. By Helen T. D. Robinson. Boston. 1958. Bruce Humphries, Inc. 60 pages. $2.75. A third volume of the collected poems of this able poetess, who passed away in 1956.

Mathematical Excursions. By Helen A. Merrill. New York. 1958. Dover Publications. 145 pages. Paperbound, $1.00. Those who delight in solving mathematics problems will find this fun and challenging.

Architects' Year Book. Edited by Trevor Dannatt. New York. 1958. Philosophical Library. 223 pages. Illustrated. $10.00. Of special interest to architects and to the architecturally minded.

The Personal Affairs Handbook. By Jacob S. Spiro. New York. 1958. Hawthorn Books. 271 pages. $3.95. This is subtitled "A Complete Guide to Financial Security and Legal Protection for Every Family."

Ostriches. By Herbert S. Zim. New York. 1958. William Morrow and Co. 64 pages. Illustrated by Russell Francis Peterson. $2.50. Popular story for the younger reader about these interesting birds.

The Meaning in Your Life. By Samuel Rosenkranz. New York. 1958. Philosphical Library. 146 pages. $3.00. The concept of a fifth dimension is utilized in this book to make a fresh approach to the problem of meaning possible.

Contents noted BY THE EDITOR

NEW YORK AND VIRGINIA are the two latest States to join the ranks of those enacting laws protecting all species of hawks and owls. It has taken a long time to break down old prejudices against these birds and to recognize the important place they occupy in the whole fabric of Nature. Under a system where three or four species were exempted from protection, all of the most beneficial kinds were shot out of ignorance, or because of desire for a target. Both New York and Virginia laws make an exception in cases where a hawk or a great horned owl may be destroying poultry or other property. Then the birds may be shot by the owners or occupants of the land involved. In New York conservationist H. Everest Clements, better known as "Hi," spearheaded the drive for the law; in Virginia the initiative was taken by the conservation authorities themselves.

A YOUTH CONSERVATION CORPS reminiscent of the Civilian Conservation Corps of the depression-struck early 1930s is proposed in a bill filed by Senator Hubert H. Humphrey of Minnesota, given the number S. 3582 and referred to the Senate Committee on Labor and Public Welfare. An identical House bill, H.R. 11773, has been introduced by Congressman John A. Blatnik, also of Minnesota. The bills would establish the Corps to provide opportunity for healthful training and employment of young men in conservation work under the supervision of Federal conservation agencies. It would also provide immediate work opportunities for young men aged 17 through 23 in areas removed from centers of population and existing work programs, and would serve to accelerate Federal conservation programs. The Corps would be under the administration of the Department of Health, Education and Welfare, which would work closely with a six-member Youth Conservation Commission representative of the Federal conservation agencies. Irrespective of whether employment or economic conditions might make such a work body specially important, we have long felt that some activity comparable to the earlier C.C.C. would be of immense value to the country's conservation efforts. It would appear that the Humphrey-Blatnik proposals meet that need.

JUNE IS NATIONAL RECREATION MONTH, although it does not appear that the American people confine their interest and participation in recreation to any one period of the year. Sponsored by the National Recreation Association, the designation of June is intended to focus attention on recreation as an essential part of living and on the rich variety of recreational opportunities available to all of us. The slogan for the Month's theme is "It's your leisure—make the most of it!" There certainly is no excuse for not making the most of it, and nowhere in the world is recreational opportunity more varied than in the United States.

A NETWORK OF BLIGHT AND UGLINESS could result if there is too much stress placed on the "economic-cure aspects" of the speeded up Interstate Highway program, warns the American Society of Landscape Architects. The Society points out that we are going to have to live with this system for a long time. For that reason, in the planning stage, there "is the utmost need for the sort of co-ordination which will suggest optimum standards among the states while there is still a chance." If the planning and construction of the increased authorized mileage to be built as a means of helping to check recession is dominated by a "made-work" spirit we may suffer from "a heritage of ugliness." This is sound advice. Also, it should not be overlooked that the billboard control provision of the highway construction bill passed at this session of Congress includes treatment of the highway environment to provide "for preservation of natural beauty, prevention of erosion, landscaping, reforestation, development of viewpoints for scenic attractions. . ." The public's stake in these highways is tremendous. The Federal law does not truly provide protection. This is up to the States (see page 313), and the task of the people of every State is to see that their legislatures enact strong laws to protect every aspect of the new highway system if the vast public expenditure is not to be wasted.

THE STORE OF THE CHRISTMAS SPIRIT is the title that Marshall Field and Company, Chicago, bestowed upon itself during the past Christmas season in an advertisement recently called to our attention. This "spirit" is exemplified in the ad, which promotes the sale of "a wild Raccoon cap by Hugger, two real skins to hang on his wall". . . Item one, at $2.95, plus tax, is the cap designed to excite the admiration of the "rough and ready crowd." Item two is: "A real animal skin to hang on his wall will make him feel like a real trapper. Wild gray fox, $2.95." Item three is: "Not illustrated: large wolf skin, $5.95." Somehow we do not seem to be able to reconcile this offering of wild animal pelts with the Christmas spirit. R.W.W.

The exhibition portion of the tunnel has a real under-ground appearance, with simulated types of soil found in the region of Tucson.
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The tunnel entrance is located along one of the Nature trails of the Arizona-Sonora Desert Museum and is framed by cactus, boulders and Indian picture rocks.
→

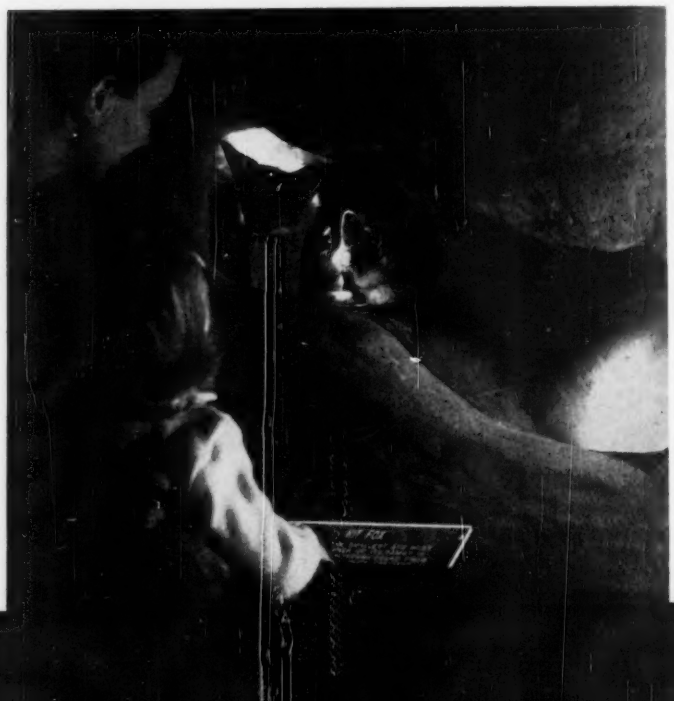
A truly unique exhibit shows

A Living World Under Ground

LIVING animals and plant roots are successfully being displayed under ground, in a new and outstanding tunnel exhibit at the Arizona-Sonora Desert Museum, located fifteen miles from Tucson, Arizona. This tunnel is the largest natural history exhibit of its type in the world. Its purpose is to display plant and animal life as these would naturally occur in a cross section of the Sonoran desert earth, and to illustrate subterranean relationships between animals, plants, and the earth.

The idea for this unique tunnel originated in the inventive mind of William H. Carr, founder and director emeritus of the Museum. During hot summer days many desert animals remain under ground, where it is much cooler. So Bill Carr felt that displaying these types of animals above ground at the Museum was not scientifically correct. He evolved the plan to exhibit living animals in natural-looking dens under ground, and, also, to show other subterranean life. Taking his idea to Arthur N. Pack, Tucson civic leader, president of the Desert Museum Association and of the Charles Lathrop Pack Forestry Foundation, Mr. Carr found a sympathetic ear and the means to launching this latest addition to the already considerable fascinations of the Arizona-Sonora Desert Museum.

A trench large enough to engulf six railroad boxcars was excavated for the tunnel, evolving into an exhibition portion sixty feet long. With entrance and exit ramps, there is a total length of 158 feet. The main portion is twelve feet wide, nine feet high, and the floor lies fourteen feet beneath the surface of the ground.



Kit foxes live in a roomy den in the alluvial soil section of the tunnel wall. Clear plastic labels explain the exhibit.
←

Big-eyed ringtailed cat gazes at visitors when they press the handrail and turn on the light in the ringtail's den.
→

soil texture in which glass-fronted exhibits are on display. The ceiling and wall on the animal side are composed of three general sections, each with a different type of surface. Here the tunnel "soil" gradually grades from red rock to caliche (a layer of rocks and gravel cemented together by a deposit of calcium) with an underlying stratum of red rock, and finally to an alluvial soil.

The first two sections, the rock and caliche, represent a cross section of the ground as it would occur approximately two feet in back of an arroyo bank in a foothill portion of the desert. The alluvial soil portion is a cross-section made through a desert valley.

As you approach the animal exhibits, you are guided by dim walking lights.

By PEGGY PICKERING LARSON

Photographs by Merwin W. Larson

As you walk down the entrance ramp of the tunnel, signs advise you that the plant root exhibits are on your left, the animal dens to your right. Entering the exhibition portion, you are soon impressed by the live exhibits, and you have a real feeling of being in an under-ground cavern.

This intense subterranean feeling is due partly to the fact that the tunnel is in semi-darkness. Also the tunnel's interior walls and the surfaces of the animal dens have been finished to provide a textured, under-ground appearance.

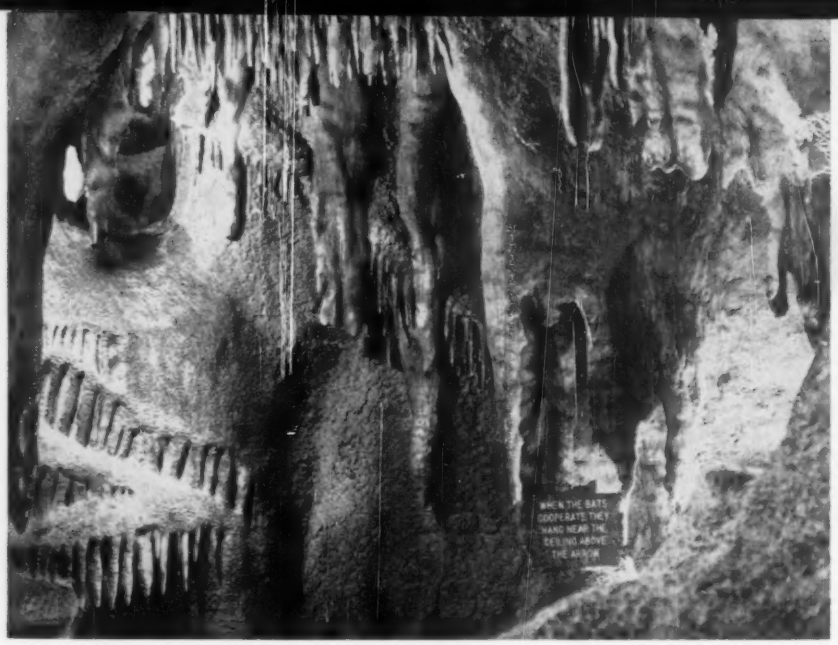
The plant side of the tunnel is finished with an alluvial

A portion of the large colony of living ants, who carry on their lives in view of the visitor.

Signs advise you to press on the handrail below the exhibits. This pressure turns on lights in the dens immediately facing you, and also lights clear plastic labels which explain the exhibits. You see the animals in natural-looking, under-ground dens, and separated from you by only a pane of glass.

As you watch the animals and read the labels, you are able to observe how these animals live under ground, and you are helped to see relationships between the animals, their environment, and, in some cases, mankind.

In caves in the red rock section live a hive of bees and two ring-tailed cats. The



The bat cave is so realistic that some visitors believe it is a natural cave and that the tunnel was built to take advantage of it.

←

The pack rat in the lower den sometimes steals the porcupine's food and takes it into the smaller cave.

→

bees have built their combs up to and against the glass face of their cave. They obtain nectar from flowers, when they are in bloom above the tunnel, and store it in their combs while interested spectators watch.

"If you are afraid of snakes pass up this exhibit. Move on to the next." This warning appears on a bright red label placed where the wall grades from red rock into gray caliche. Faint-hearted souls—and there are few of these—pass by this exhibit. Most people cannot resist looking. They see ten to twelve living diamond-back rattlesnakes in a series of small caves in a caliche bank. The real setting and their proximity to the visitors make the snakes altogether too close for comfort. Occasionally the reptiles assert themselves with a rattle, but more often they take life easy by sleeping singly, or in a mass akin to a snake-hater's nightmare.

Two herbivorous animals, an indolent porcupine and an ambitious wood or pack rat, are neighbors here in the caliche. The pack rat's home is connected by a small tunnel to that of a porcupine. In the desert, pack rats line their tunnels and dens with cactuses to discourage predators, and the rats apparently are not bothered by the spines. The rat on exhibition provides a vivid example of this type of impunity, for he "packs" home the shed quills of his porcupine neighbor, and, much to the surprise of tunnel visitors, incorporates them into his nest.

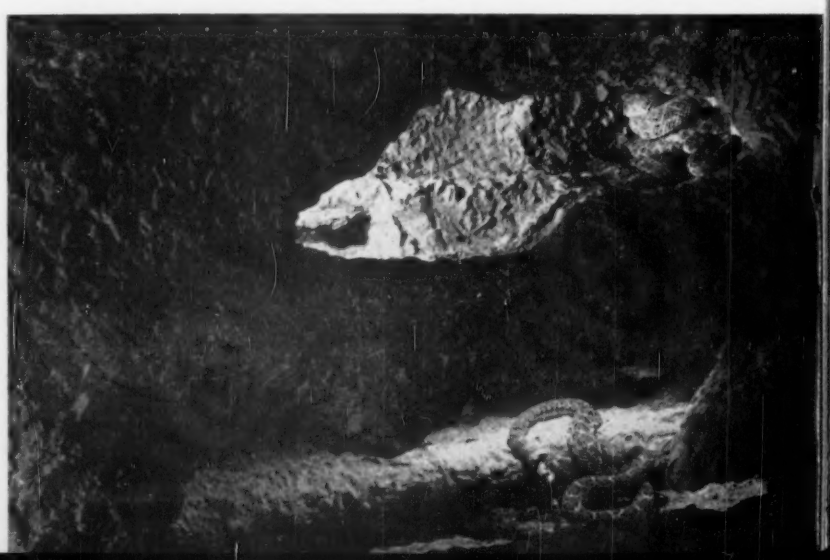
Also living in dens in the caliche are a hooded skunk, a spotted skunk and two badgers. These predatory animals are valuable in rodent control in Nature. Were the tunnel really Nature in the wild, one of these animals, or perhaps one of the ring-tailed cats or snakes, might well have managed to devour the quill-packing wood rat. The badger, as the tunnel label points out, is particularly well suited for this, being a powerful digger.

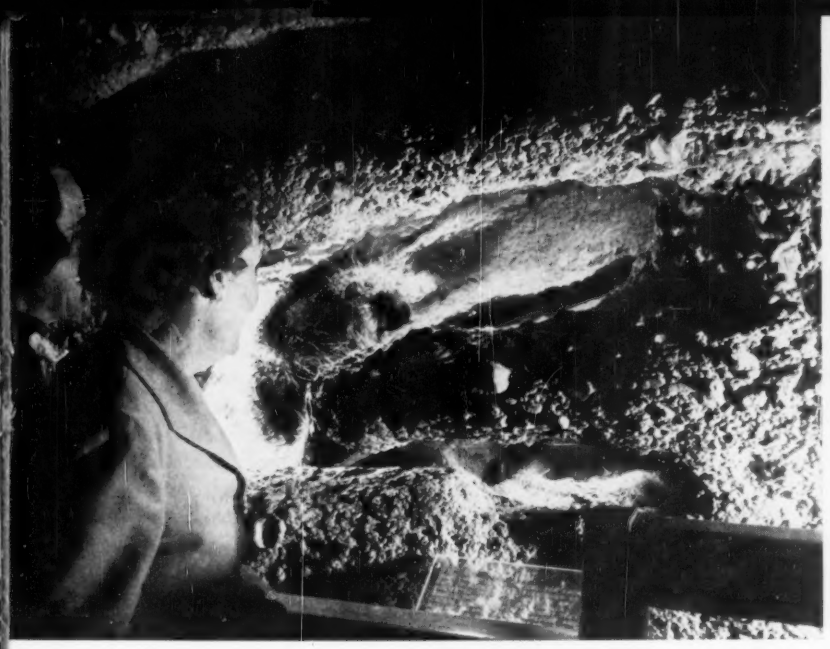
An outstanding example of a relationship between a predator, a prey, and human beings is provided in the valley cross section. Here a prairie dog burrow is occupied by four of these winsome animals. You see, behind glass, the entrance tunnel of the prairie dog home as it descends downward from the surface of the ground, passes a listening perch, and turns to become a horizontal portion with nest chambers. Adjacent to the prairie dog burrow is a den occupied by ferrets.

The label points out that prairie dog towns once covered vast areas of this country. Some were 100 miles long, 250 miles wide, and contained perhaps 400 million "dogs." The agile, streamlined ferrets were also very numerous, for they subsisted by entering the prairie dog burrows and devouring the occupants.

It was estimated that 256 prairie dogs ate as much grass as one cow. Consequently the "dogs" were doomed. Vast poisoning campaigns have practically eliminated prairie dogs today, and, with the great decrease of their prey, ferrets have become nearly extinct. Those on display in the tunnel are necessarily European ferrets, a close relative of our American black-footed ferret. The two in the tunnel live in a den that was constructed so as to appear to have been blocked off from the prairie dog burrow as a defensive maneuver by the rodents.

Two kit foxes also live in a den in the valley cross





section. You learn, by reading and observing the animals before you, that these foxes are protectively colored to blend in with the desert sand, and they have extra large ears that are a special adaptation for detecting rodents, their primary food.

A whole family of what the foxes would consider tasty rodents live directly across the tunnel from the fox den. While you may not like mice in your house, it would be difficult not to be charmed by this mouse family in its own happy home. The mice live in two miniature underground hollows partially formed by plant roots in an exhibit on the plant side of the tunnel. This display provides one interesting commentary on the relationship of plant roots and terrestrial animals. The exhibit demonstrates that the penetration of roots through the soil opens fissures that are used by these tiny mice for tunnels. The side rootlets of the plant help support some of the rodents' underground chambers. The label points out that the mice bring many seeds under ground and store them in these hollows, placing them in ideal locations for future growth.

No more welcome than mice in the kitchen are ants at a picnic, but in its proper place in the tunnel is a colony of living, working ants that composes one of the most interesting and informative exhibits on display. This exhibit, measuring two feet by three feet, makes it possible to observe ant life at first hand. It is composed of a series of glass-faced tunnels and rooms where the ants are living in normal ant fashion, and the visitor has an opportunity to study the highly organized activities of these social insects. The workers carry larvae and pupae about to rooms designated for these. Even the queen is visible to onlookers. Here she is surrounded by those members of the colony whose duty it is to protect and care for her.

We humans are accustomed to seeing plants growing above ground. Moles are better acquainted with the roots of the plants, but as a visitor to the tunnel you have the unique opportunity of obtaining both a human's and a mole's view of growing plants. By pressing plastic buttons to turn on the lights in the plant exhibits, it is possible to see, behind glass and backed by soil, the roots of various living plants. Then, by looking through a periscope, you can observe the plant as it is growing above the tunnel in the desert sunshine. Periscopes at both an adult's and a child's eye level are provided at each of these exhibits.

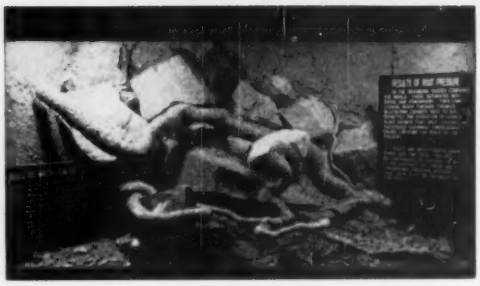
Other displays interpret the functions of plant roots and their relationships with the earth. Here roots twist and turn in the process of growing among rocks. The exhibit demonstrates and the labels explain that roots probe into tiny crevices among the rocks. If moisture is present, they grow and exert tremendous pressure, wedging crevices open and splitting rocks in the process. Labels also call attention to the fact that roots aid water penetration into the soil by providing channels to underground water tables, and that they are an important aid in preventing erosion.

Roots are simply roots to many people, but another

Living diamond-back rattlesnakes in caves in a caliche bank provide an exhibit that is completely realistic. ←

Members of the museum staff prepared a latex cast of a rock wall in the desert. The cast was then removed and recast in red plaster in the tunnel for the red rock section of the tunnel wall. →

interpretive exhibit illustrates how incorrect that attitude is with a display of four diverse types of roots. Labeled a "worm's eye view of four root types," it demonstrates that some plants, such as mesquite, have long tap-roots that reach to great depths for water in the dry desert. A gourd root is a bulbous affair and stores water to use in times of drought. Grass roots are both shallow and deep, and so have a great combined length to aid in water absorption. The fourth type, those of a saguaro cactus, are mainly horizontal and near the surface of the earth, providing for quick and efficient absorption of water during rainy periods.



This display, on the plant side of the tunnel, explains the value of roots in checking erosion and also shows how roots are capable of splitting large rocks.

A so-called root that is not a root qualifies as one of the highly unusual exhibits in the tunnel. This is a "lightning root," or, more correctly, a fulgurite. Lightning striking in sand causes the sand to fuse together and form what appears to be plant roots underground. You see one of these "roots" on display in conjunction with a diorama illustrating just how such a root would be formed. The diorama provides what seems to be a view out of the tunnel to the desert. By pressing a button the visitor sees and hears lightning striking from a cloud above into the desert sand below.

The outstanding exhibit in the tunnel is a cave where living bats are being exhibited. You look into the cave through a large window located in the center of the wall devoted to animal dens. As you press on the handrail here, the lights in the cave go through a 90-second cycle, from dim to bright and back to dim again. As the lights slowly brighten, you become aware of stalactites, stalagmites, and rock columns within the cave. Water drips from a stalactite into a pool below. The walls and formations are mottled tones of brown, orange, yellow, and green. On the back wall is a rock formation resembling a frozen waterfall, and below it a hole appears to be an opening to a lower level of the cave. You see, beyond a series of arches, a view of sky and clouds. This appears to be visible through the bats' entrance to the cave some forty feet away. As the lights become bright, you suddenly detect a group of bats hanging on a fluted column directly in front of you. There always seems to be some motion within the group. Some sleep quietly, others clean themselves or stretch their wings, some merely move about, and occasionally one or more fly about the cave.

The highly realistic cave and the living bats compose a sight few tunnel visitors have ever seen and one they will not soon forget. But in back of an enjoyable and educational visit stand eighteen months of thought and hard work on the part of the museum staff, under Director William H. Woodin, who built the tunnel.

Lewis Wayne Walker, assistant director of the Museum and Mervin W. Larson, curator of exhibits, were responsible for planning and building the animal exhibits and the bat cave. Mr. Larson also created the two interpretive root exhibits and Mr. Walker built the lightning root display. Alan Blackburn and John Blydenstein were responsible for the living plant root exhibits complete with periscopes. A great many other friends and employees of the Museum offered ideas and aided in the construction of the tunnel itself and the exhibits it contains.

Since few precedents have been set in this type of work, a great deal of study, debate and just plain experimentation were used to solve the problems faced by the staff as they built the tunnel. How could the interior walls be completed to provide an authentic under-ground texture? How do you build a bat cave to make it appear to be a genuine cave, and how do you keep bats healthy and happy in captivity? How could a colony of ants be obtained and convinced that they could live happily in a new man-made home? Each day new questions such as these arose and gradually were answered, as is proved by the realistic and scientific results now on display.

Eleven tons of casting plaster, all of it necessarily mixed in small batches and applied by hand, were used to give the interior walls an under-ground appearance. For the entire red rock section of the walls and parts of the caliche section, liquid latex was "painted" on actual formations in the desert. These negative casts were then removed, taken to the Museum, and recast in colored plaster on the tunnel walls. In this way, every natural feature was duplicated.

Dig a trench six feet deep adjacent to an ant nest in the desert, then dig into the nest itself and gently capture each ant in the colony. This was the formula that gradually evolved for obtaining the colony of ants. Tunnels and rooms were then drilled for them, and lined with sand, in a piece of two-inch-thick, clear plastic. Experimentation determined the right degree of heat, light, and moisture required for the ants' well-being in each part of their new home.

The bat cave, however, was the most ambitious single project undertaken in the tunnel, and everything from cypress knees to heads of cauliflower were used to construct it. It was copied as closely as humanly possible after actual caves, and here, once again, latex casts were made of formations in caves and duplicated in the tunnel. Cypress knees were used as patterns for casting large stalactites and stalagmites and heads of cauliflower were used to reproduce actual cave formations that look like nothing else so much as cauliflower heads. Great care was used to duplicate natural cave coloring in the tunnel cave.

(*Continued on page* 332)

The Spotted Owl

By GRACE MADDOCK MILLER

Photographs by the Author

The author and her husband sighted the spotted owl sitting on the lower branch of a tree, silhouetted plainly against the sky.

I HAD MY first sight of that prize of bird watchers, the seldom-seen spotted owl—bird of the remote and deeply wooded canyons—within fifteen feet of my own kitchen window. Living not in a canyon, or even in heavy woods, but in a thinly-wooded residential area of northern California, we hardly would have expected to find *Strix occidentalis* as such a close neighbor, even for the brief span of one day.

All during the morning of the twenty-sixth of July, 1956, I had been aware of the insistent calling of a house finch in the bay trees nearby. But I was busy with house guests, and it was only a background accompaniment to our activities and conversation. Then, in mid-afternoon, I went out to the front porch to replace bird food in the feeding tray, and realized that not only the finch but other birds were scolding and calling, all in the same group of trees—robins, the finch, a russet-back thrush, hummingbirds. Looking toward the back of the house, I found the focus of their attention, a brown bird sitting quietly on the lower limb of a pine tree, quite near the kitchen window.

"A hawk," was my first thought; but a closer look showed the round head, the dark eyes, the indolence (or fearlessness) of my first spotted owl. From that moment I spent my time running from house guests to pine tree guest, binoculars or telephoto lens and camera in hand. Pictures were unsuccessful. The spotty light fitted in with the owl's camouflage beautifully, but was poor for photography. Tree limbs interfered. The owl was too directly overhead, too far away for an ordinary lens, too close for a telephoto.

Late in the afternoon, the bird moved to another tree nearby, still not far from the ground, and at eight o'clock it took off in such completely soundless flight that I could hardly believe it had flown. Recently I watched a pair of barn owls, and the initial wing-beat as they left their cypress-tree perch was quite audible; but my spotted owl made not one flap that I could hear. He landed in a neighbor's tree and I followed and watched, until he again flew, this time over the rooftop and away.

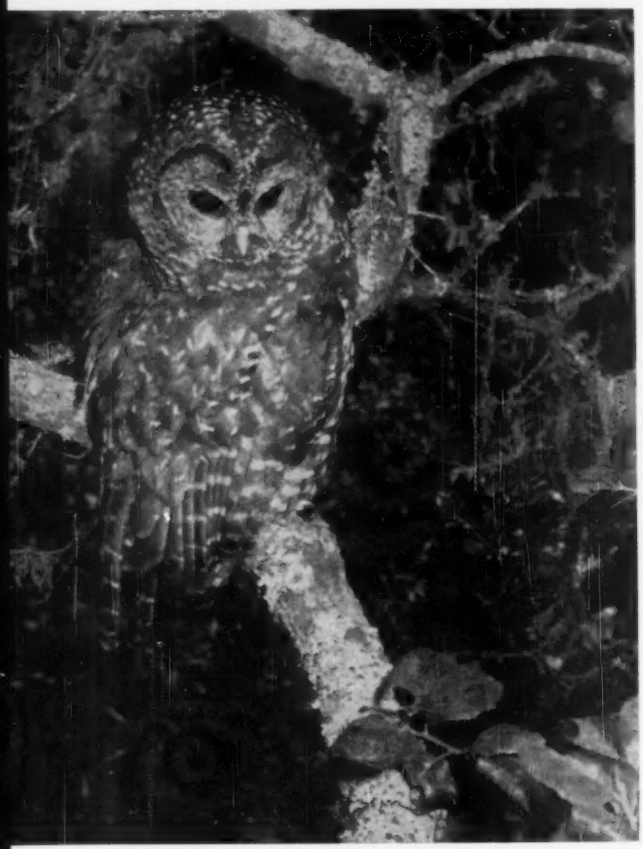
A month before, a neighbor had reported a family of four, or maybe five, spotted owls on the hill in back of our village; but this one was in the midst of residences, although in a thinly-wooded setting, and came at a time when all the houses are filled with vacationing families. Spotted owls generally are thought to be residents of dense woods, so the appearance of this one in a thickly inhabited area seemed quite unusual.

My next sight of the owl was on June third, a year later. My husband and I were walking to the beach along a path beside a marshy area in which grow many old alders, leafed quite sparsely, and open to the light. We sighted the bird from some distance, silhouetted plainly against the sky, sitting once again on a lower branch some twenty feet above the ground. We took pictures, moved around without caution below the owl, and called to try to get the bird to open its eyes. Sometimes the owl turned its head to look at us, but most of the time it seemed more interested in going to sleep. (The barn owls flew at the sound of our steps upon the road near their perch.)

After a while we went home, and in the evening brought two friends to see the spotted owl. While we watched, we heard one barking note from somewhere behind us, like that of a small dog, but from tree height.

We looked around, but saw no other owl. Then, suddenly, our friend flew a short distance to the lower limb of an oak tree across the path, and almost directly above us—surely not more than ten feet above our heads—and landed beside a second owl. The two sat there until we left, each frequently running its beak through the neck feathers of the other bird, but without the cooing sounds described by Lawrence Peyton, an earlier observer. Perhaps June is not too late for courtship?

The next day, one owl was perched in another oak by



"Sometimes the owl turned its head to look at us, but most of the time it seemed more interested in going to sleep."

the same path. I telephoned some "birding" friends in another town—one of them an artist who paints bird pictures—informing them of the rare find, and they found the owl there. The artist drew sketches. Several days later, the owl was perched in the horizontal crotch of an oak growing out of the hillside, still beside the same path, and I was able to get within six feet by climbing to the same limb without disturbing our friend in the least. The owl was quite sleepy, and to get it to open its eyes I had to rustle a stick against the leaves on the ground below. Perhaps the bird thought this sound meant a mouse nearby.

When I came back from the car, after getting more film, I found the owl on the ground below the tree, but it flew back to its former perch almost at once, and stayed there. My acquaintance preened and shook its feathers, bit its feathered feet, and was generally at ease and quite unconcerned that I was standing on the tree limb and flashing bulbs from a close distance.

That is the last time the spotted owl was seen. The path to the beach had much foot traffic from then on, for school was out and vacationers at hand, so it probably chose a less travelled spot, more restful for an owl that enjoys ample sleep. I do not think that fear of humans could have had anything to do with the change of daytime perch. In early fall, barking notes have been heard from the same area at night, so perhaps the bird returns after dark.

A sight of this large, dark-eyed owl is the goal of many experienced birders, and luck seems to be the largest factor in finding it. A retiring nature and indifference to physical activity hides the bird from view, in addition to a usual choice of heavily wooded areas.

The spotted owl is a Western relative of the Eastern barred owl, and is sometimes called the Western barred owl, although the markings are different, as the name suggests. The range is considerable, reaching from northern Mexico and Baja California along the coast to British Columbia, and in the mountains to southern Colorado. In California, it is found in the Upper Sonoran and Lower Transition zones west of the Sierra Nevada divide, and has been most common (if it could be called common) in the San Diegan district. Three races are listed, *Strix occidentalis occidentalis*, found in southern California—especially the San Diegan area and in the Sierran foothills, two apparently separated areas—*S. o. caurina*, the northern spotted owl, found in the area from British Columbia to northern California as far as San Francisco, and *S. o. lucida*, the Mexican spotted owl, found in New Mexico, Arizona, and up to Colorado. There are some differences in coloration, but no apparent field differences between these three races. In any of its chosen localities the bird is rare, or at least a rare sight.

Several chapters in the life history of the spotted owl seem to be a matter of conjecture, since disagreeing statements are to be found in the few accounts available. Their rarity is one of these. The question seems to be: are they "rare" because they are seldom seen in their usually remote and wooded haunts, where their nocturnal habits, protective coloration and stupidity (or tameness) render them ordinarily invisible? Or are they rare in actual numbers?

Both Hoffman and Peterson call them "rare," as does Alexander Wetmore, and Taverner for Canada. Grinnell and Miller say "numbers nowhere large," George Willett "resident in small numbers," Bent "retiring habits, so maybe more common than supposed," Merriam "fairly common"—referring to the northern *S. o. caurina*. Sumner and Dixon ascribe rarity to a "dearth of nesting sites and vulnerability to the horned owl." Marshall stated in 1942 that he believes food require-

ments have nothing to do with rarity, since these are so diversified, but thinks that the density and height of timber in the transition zone attracts them.

The mention of nesting sites brings us to another disputed point. Most accounts specify locations for nests to be in cavities in cliffs, or sometimes in hollows in trees, with no nests being built, although abandoned ravens' nests have been used. Fred Truesdale, and also M. C. Badger, note nests in old hawks' nests in trees, and Alexander Wetmore, in a published account in 1935, defines their nests as "structures of sticks, lined with bark and other soft materials, in the fork of a tree or cavity in rocks."

Perhaps the nesting preferences are as varied as the diets of these birds. Rats, mice and nocturnal crickets seem to be the staple, but bats, flying squirrels, grasshoppers, pygmy, saw-whet and screech owls, frogs, moles, shrews, June beetles and small birds evidently snatched from their roosting perches at night have all been found as stomach or pellet contents. And, in Yosemite Valley, where the bear feeding pits were within feeding range, pellets contained muskmelon seeds, chop bones and egg shells, according to Charles W. Michael. A tame owl is said to have accepted mice, rats and chipmunks, but to have refused all birds.

The voice of the spotted owl is most often described as similar to the barking of a small dog, higher in pitch than the hoots of the horned owl, or to the baying of a distant hound. But the notes are evidently as varied as the owl's diet. Grinnell and Storer say it is not heard until late dusk, that the call is abrupt and high-pitched, with two long and two short notes. I have heard this call recently. One owl called with a five-note call, *HOW how-how HOW HOW*, and from across the valley another answered, *HOW how-how HOW*. Dickey describes an "indrawn whistled 'whee-ee' and a 'turkey-like chuckle,'" Clay mentions a whining, grating sound, Dickey a dove-like hoot, and Peyton "cooing sounds."

But all authorities unite in their reaction to the behavior of the owl. Call it stupidity, call it sleepiness, call it misplaced confidence or indifference or unusual tameness, the spotted owl undoubtedly is a strange wild creature in its lack of reaction to human interruption of its daylight sleeping hours—or even to intervention at its nest, according to Dickey.

The owl in the illustrations was still hunched peacefully on the tree limb when I last saw it, even after I had climbed to within six feet of it, and after some three dozen pictures had been taken, many by flash. With large dark eyes closed to slits, and mottled coloring blending into the light and shadow of the woods, the bird's only evident reaction might best be expressed in these words—"Please go away and let me sleep!"

A Brook of Your Own

By HAYDN S. PEARSON

EVERY PERSON should have a hill, a small field, and a peaceful woodland brook that he can call his own. This does not mean legal ownership; it means something richer than ownership confirmed on man-made paper. It means a spiritual ownership, a heart-companionship that deepens and enriches as the swift years of a man's life speed by. There is wearying confusion and harsh cacophony in the world's market places; heart and mind grow tired with the ceaseless buffeting and surfeited with the increasing complexity of human society.

There is rest and peace, a refueling of the reservoirs of heart and soul in the quiet loveliness where a small woodland brook flows among tall trees. The over-arching branches and tall boles are Nature's cathedral. Each woodland brook has an individuality of its own; each brook has particular areas that appeal to different persons.

One of the most interesting places is beside a small waterfall where clear, singing water falls to a pool below. Here the water weaves ever-changing patterns of gray-white lace; here the stones at the bottom of the pool gleam and glow with rich colors. Ferns lean over the water and move gently in the air currents. Birds come to bathe in shallow pools, and deer come at dawn to drink.

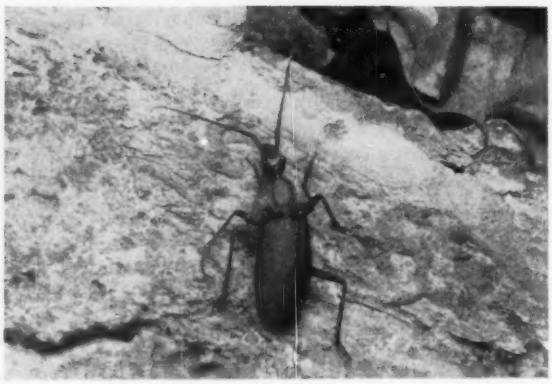
On a quiet, brooding July day, a rose-breasted grosbeak may sing his haunting, throaty song, and an oven bird call emphatically from the forest floor. Here in spring the Jacks-in-the-pulpits stand up to orate, and colorful ladyslippers lift delicate pink and rose to the golden shafts of sun. There are indeed books in running brooks and sermons in the stones that cause ripples in the water. If you have not yet a brook of your own, there will never be a better time to own one. In its soothing song, in its changing beauty through the season, you will find something that has never been achieved in man-made creations.

BAT

By Cynthia Eaton

I see you, bat,
With tissue-textured wings
Stretched taut over twigs
Of slim, ribbed willow,
Like some forgotten kite
Left to skim and skitter
Through the twilight sky.

Common in suburban gardens, *Dicaelus dilatatus* renders a distinct service to gardeners by consuming many harmful grubs and other pests.



Predaceous inhabitant of moist woodlands, *Galerita janus* is one of the commoner Carabid beetles found in the eastern United States.

Build Your Own "Beetlearium"

By JOHN and MYRA MEHRTENS

Photographs by the Authors

THAT VAST segment of the insect world, the Coleoptera, or beetles, has captured the interest and imagination of man for unnumbered years. The bewildering array of size, form, and color presented by these insects have brought them notice from the jungle dweller, who uses the brilliant, metallic wing covers of the Buprestrids as objects of personal adornment, to the trained scientist, who endeavors to create order from the vast multitude.

In surprising contrast to such diverse interests is the fact that, except for a handful of typical species, little or nothing is known of the life history or habits of the living animals themselves. Here, then, is a field of study worthy of the attention of both the amateur and the professional naturalist.

The tibia of the male's front legs, in the Asiatic *Propomacrus macleayi*, have evolved into spindly, antler-like appendages of unknown specific use but fantastic in appearance. Many beetles lack popular names.

If you have ever turned up a stone or torn the bark from a dead tree, and taken more than a cursory glance at the creatures living there, you have, no doubt, marvelled at the many activities taking place. To indulge your curiosity, you must either crawl through the litter of the forest floor, magnifier in hand, or else devise some way of observing these creatures in a confined space at your leisure. The answer, of course, is a suitable terrarium that duplicates, as nearly as possible, the natural habitat of the animals to be studied. We like to call the ones we use for beetles our "beetleariums."

"Beetleariums" may be as varied as the insects they are designed to house. Many of the species found in damp woodlands adjust readily and thrive in a small, typical terrarium. Using a small aquarium tank, or one of the numerous clear plastic containers now on the market, a thin layer of soil or rotted wood fibre is placed on the bottom. Then this is covered with a layer of moss, on which is tossed a few dead leaves and bits of bark. The arrangement should be kept rather cool and moist. It is a good idea to take a temperature reading of the ground where your beetles are collected. This basic arrangement may be varied to suit the individual needs of the species being kept under observation.

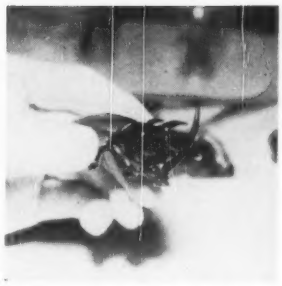
Typical of the beetles well suited to such an arrangement are the Carabids, or ground beetles. Most members of this family (there are more than 20,000 species) are predaceous animals, both in the larval and adult stages. Active mostly at night, they accept readily as food small caterpillars, worms, or even other beetles. Some of them are surprising in their voraciousness, and we recall the time we watched in amazement as a large *Calosoma scrutator* stalked, battled and eventually consumed a good-sized land snail. In winter, or when other foods are scarce, the larval stage of the meal beetle (*Tenebrio sp.*) makes a good substitute. These are readily obtainable at most pet shops, where they are raised in

quantity for use as a bird food. One of the more common species of these ground beetles is the lanky, red-legged *Galerita janus*, a swift-running species often found in small groups under stones and fallen bark in damp woodlands. Another species, of considerable economic importance, and usually obtainable from any suburban garden, is the heavy-jawed, black *Dicaelus dilatatus*. The accompanying illustrations of these beetles—as well as the other photographs—are of specimens living in "beetleariums."

If you happen to live in the south-central States, a search of woodlands where the soil is somewhat sandy should produce a few specimens of the impressive, scimitar-jawed *Pasimachus punctulatus*. These large beetles are active hunters, and are capable of attacking large caterpillars, or other beetles. A pair from Ohio's Shawnee Forest once devoured more than a dozen bessybugs in a few days' time.

Speaking of bessybugs—or more properly, *Popillus disjunctus*—we might mention that, although they have been extensively studied in the living state and quite a bit is known about them, they are nevertheless fascinating animals to keep. They require a slightly different arrangement than that of the "beetlearium" just described. Several handfuls of the decaying wood that is commonly found in well-rotted logs, covered with a flat piece of bark, is all that is required. The wood fibres should be kept moist. By way of showing what can be learned from keeping beetles in captivity, it has been discovered that the very young larva of this beetle requires parental care, and the information available suggests that the young are fed by the parents on predigested wood fibre.

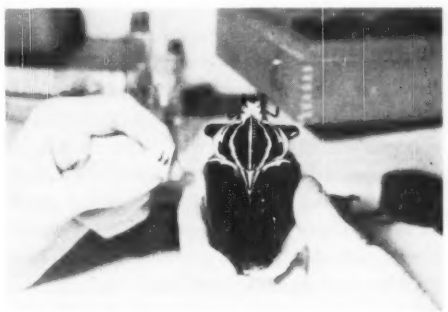
As the larva grows, its dependence upon the parent beetles diminishes, and eventually it feeds itself. Upon reaching the proper size, the larva pupates, and the eventual emergence is every bit as fascinating to observe as the emergence of a butterfly or moth. Light reddish-brown in color, the imago soon darkens to the shiny black characteristic of the adult stage. These beetles also are capable of producing squeaking sounds by rubbing the stiff bristles on their upper abdomens against the heavy wing covers, or elytra. Some authorities maintain that they can communicate with each other in this fashion.



Males of the Dynastid group sometimes carry horns on the head and thorax, like this three-inch specimen from Siam.

The common eyed elater, or click beetle, *Alaus oculatus*, with its large, protective eye spots is a species as interesting as it is colorful. Although most Elaterids live under ground and subsist on root juices, the larvae of *Alaus* are carnivorous. Sometimes they may be found in abundance beneath the bark of dead apple trees, and are easily recognized by their cylindrical shape and large size.

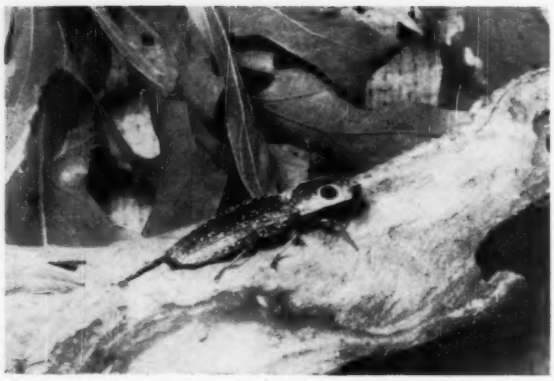
A "beetlearium" with a floor covering of fine dry soil, with a small wad of damp moss in one corner, makes a hospitable home for a specimen or two of the tiger beetles, Cicindelidae. Nearly everyone is familiar with



The study of beetles takes you from tiny creatures like that on the left to huge Goliath beetles from Africa, at right. Both belong to the Scarabaeidae.

The large jaws of carnivorous *Pasimachus punctulatus* make it well-equipped to capture the small invertebrates on which it lives.

Hairy legs, peculiar antennae, and a "horn" on the head makes the identification of the bessybug, *Popillus disjunctus*, an easy matter.



With its large "eye spots," *Alaus oculatus* makes a striking subject for "beetleariums" and Nature photographers.

the fast-flying, brilliant metallic-green species, *Cicindela sexguttata*. Perhaps you may be fortunate enough to obtain some of the larvae, which construct long tunnels in the soil and lie in wait at the mouth of the burrow for whatever creature small enough to be eaten may happen along. The strong jaws afford the hapless victim small chance for escape.

We hope that by now your curiosity is sufficiently aroused so that you will be interested in trying a "beetlearium" of your own. If so, perhaps you may wonder where you can find your specimens. The answer is astonishingly simple—everywhere. Your collecting grounds may be in a city park, a wilderness, an empty lot, or your own backyard. The only collecting equipment you really need is a jar or two, and observant eyes. However, as you become more proficient, you may want to add such tools as trowels for digging out burrows and breaking apart logs, sieves for sifting leaves and other debris, aerial nets for the day-flying tiger beetles and scarabs, and aquatic dip nets. And remember, ponds and streams should not be overlooked. For in them dwell the whirligig and diving beetles, easily captured and easily kept in a small, planted aquarium . . . without fish!

Such specimens as may die in your "beetleariums" should not be tossed on the rubbish heap, but should be retained, both for positive classification and to add more value to your notes and photographs or drawings. These specimens, along with the extra ones found on your field trips, may form the nucleus of an interesting study collection that, properly managed, will be of sound scientific value for years to come. For the sake of those not familiar with the preparation and preservation of this group of insects, we present a brief resume of the basic techniques.

Specimens that have died a natural death need only to be mounted. Living specimens, destined for inclusion in your study collection, may be killed by placing them in a killing jar charged with non-poisonous ethyl acetate, or by dropping into a vial of 60% alcohol. After death, the insects should be arranged in such a manner as to prevent breakage of the delicate legs and antennae, the usual method being to tuck these appendages under, or along the side of, the body. Specimens that have dried and can not thus be adjusted may be relaxed by leaving them for several days in a tightly covered jar that contains a wad of moist cotton and a few moth balls for the prevention of mold formation.

Beetles are mounted on special, rust-proof pins designed for the purpose, and readily obtainable from any biological supply house. The cotton-filled "Riker mounts" are unsatisfactory for beetles, as the fibers of the cotton tangle in the legs, and otherwise destroy much of the specimen's value. A #3 pin is the size most useful to the general collector. All insects are pinned in specific places, the correct place for beetles being through the right wing cover, a short distance behind the front margin. Incidentally, the pin should be placed in the specimen prior to drying.

A specimen without data is of no value except as a curio, so the next step is a proper label. One or several may be used, but they should be small and include such information as the date of collection, the locality and any other data you may consider pertinent. The label is then placed on the pin, leaving a small space between it and the specimen itself.

Labels for such larvae and pupae as you may wish to retain should be written in pencil and placed in the vial of preservative along with the specimen. Lacking the chitinous exoskeleton of the adult stage, sub-adult forms must be preserved in fluid, usually alcohol.

The mounted insects may be stored in tightly covered boxes furnished with a pinning bottom, or in glass-topped trays for display purposes. Always be certain to include moth flakes in the specimen boxes to prevent the ravages of the tiny Dermestid beetles that like nothing better than to chew up prized specimens!

Information concerning the identification of beetles is rather scarce. Most general insect guides have a section on the Coleoptera, and the Brown Publishing Company, 915 Main Street, Dubuque, Iowa, publishes a little book dealing with beetles exclusively. Insect guides are usually obtainable at libraries, and will be needed to help you identify your catch.

Much pleasure and profit may be derived from the study of living beetles in an appropriate environment. Our studies have given us endless hours of worthwhile enjoyment, and we hope yours may do the same for you. May we wish you happy "beetling!" ❦ ❦ ❦

"TO EVERY THING ...A SEASON"

Weeded out and cursed by man
The purple thistle still is blest:
Its soft heart cradles pale blue eggs
In the goldfinch's downy nest.

Emeline Ennis Kotula

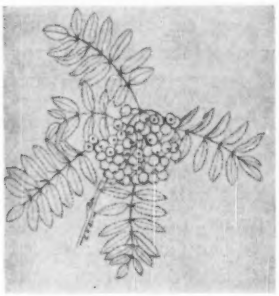
A Saga of Plants

By EDNA PECK ATWOOD

Illustrations by the Author

The fruit of the hazel nut tree or shrub has been thought by primitive peoples to confer the coveted power of invisibility.

LIKE HUMAN beings, plants live, grow and die. They are subject to accidents and diseases, and some have healing or poisonous qualities. Perhaps it was quite natural that, in times past, plants were thought to have spirits and supernatural powers, and that a phase of the world's folklore should have grown up around them. Many of the trees, shrubs, weeds, herbs and flowers that you will see on a leisurely walk through the countryside have been invested with some superstition or story that sprung from the inventive imagination of man.



Old tales say that the mountain ash, or rowan tree, sprang from lightning bolts.

Trees, the largest plants, often were held in reverence by the people of antiquity. In Norse mythology, Yggdrasill, a great ash tree, was said to bind together earth, heaven, and hell. Its branches supported the sky, and its fruits were the stars. Under one of its roots lived Hela, daughter of Loki, who contrived discord and mischief. Hela was queen of the lower world and goddess of the dead. The frost giants lived under a second root and mankind dwelt under a third root. The *Edda* of the Norsemen says that the court of the gods was held under Yggdrasill's branches. A wise eagle perched in the tree-top and watched all that passed, while a squirrel, Ratatosk, continually travelled up and down the trunk bearing messages of strife.

At Geismar, a village in western Germany, there once stood a sacred tree called the oak of Jove, the *Robur Jovis*. Because he considered it an idol, St. Boniface destroyed it about the year A.D. 724, but in revenge, he was killed by a band of citizens, who believed their own and their town's welfare hinged on the preservation of the tree. German villages often had a tribal tree—a half-idol. Located at Marburg-on-Diemal was a great tree of the Saxons called Irminsul, in honor of Irmin, a god of the ancient Germanic tribes. It was worshipped as a seat of the gods or of ancestral souls.

In Westmanland, a county in central Sweden, stood the Klinta Tall, said to be a habitation tree under which a mermaid dwelt, and to this tree it is said that snow-white cattle were occasionally driven up from a nearby lake. In Greek and Roman mythology, dryads, or hamadryads, had their lives linked to their habitation trees. If the tree was destroyed, the dryad perished also.

A familiar story is that of the nymph, Daphne, who was changed into a laurel tree to escape Apollo. Similarly the nymph, Lotis, became a lotus plant when pursued by an admirer. For unwittingly wounding Lotis by picking lotus blooms, Dryope was changed into a tree. Anciently, it was a common belief that trees or plants harbored goddesses in disguise. Since trees were supposed to harbor divinities, strange customs resulted. In Westphalia—which in time became a part of Prussia—formal announcement of a family death was made to the nearest oak.

The oak, the elm and the ash have been held sacred by the peoples of many countries. Men were said to have sprung from these trees; an idea that would give our expression "family tree" a more than whimsical meaning. The oak lays claim to many myths. Where Thor was worshipped, any tree in the woods might be cut except the oak and the hazel. Oaks were often planted

One of the plants that was said to have been employed by witches was the foxglove.

on boundary lines, and because of the ban on cutting them, the line thus was maintained.

Sir John Lubbock, famed naturalist and anthropologist, told of an oak copse at Loch Saint, in the Isle of Skye, that was held so sacred that no one dared break the smallest branch from it.

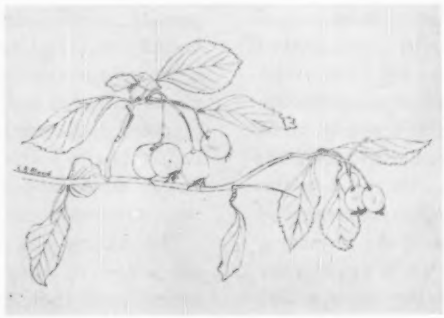
John Aubrey, English antiquarian who died in 1697, wrote the following: "I cannot omit taking notice of the great misfortune in the family of the Earl of Winchelsea, who, at Eastwell in Kent, felled down a curious grove of oaks, near his own noble seat, and gave the first blow with his own hands. Shortly after, his countess died in her bed suddenly, and his eldest son, the Lord Maidstone, was killed at sea by a cannon bullet."

There were superstitions regarding holes in trees. American Indians believed that holes in trees were doors through which the special spirit of the tree passed, while Germans thought such holes were elf pathways. They fancied also that various diseases could be cured by contact with the holes.

Gilbert White, early English naturalist, tells in his *History of Selborne* that "in a farmyard near the middle of the village stands at this day a row of pollard ashes, which by the seams and cicatrices down their sides, manifestly show that in former times they had been cleft asunder. These trees, when young and flexible, were severed and held open by wedges, while ruptured children, stripped naked, were pushed through the apertures." Such a belief and practice seems not to have been confined to any special place.

Coming down the scale to lesser trees and plants, in Danish tradition the dwarf thorns, sometimes seen in fields, were thought bewitched, and were avoided by night. In Brittany, it was considered unsafe to pluck even a leaf from a solitary thorn, because thorns were fairy trysting-places. The Judas tree was a favored witch haunt, unsafe to approach after dark, and the elder fell in the same category.

Many myths surrounded the mountain ash, or rowan tree. Its old-world name came from the Danish "roun" and the Swedish "runn," both traceable to the old Norse "runa," meaning a charm to avert evil. Old tales had it that the rowan tree sprang from lightning. The wood was carried as a talisman or, after the Christian era, made into crosses and worn, and its twigs were put over stable doors to keep out witches. In Iceland, it was said that the mountain ash would appear on the graves of innocent persons who had been executed.



In Brittany, it was once considered unsafe to pluck even a leaf from the thorn bush or thorn apple, because such plants were the trysting-places of fairies.

The holly tree, the bay tree, and the birch were said to be protective against lightning, and so were St. Johnswort and house leeks. During thunder storms, Tyrol mountaineers put nettles on the fire. In Venetia, an olive branch on the mantle piece served as protection, while hazel was a shield against both lightning and witches. Hazel and white thorn were associated with marriage rites, insuring a family, and hazel and mistletoe shared one attribute, that of invisibility.

Mistletoe was venerated by the Druids, especially when it grew on an oak tree. Many superstitions surrounded mistletoe. It was regarded as a protection against fire, and against nightmares and other night frights. It was held to be an antidote to poisons, and a specific in apoplexy and epilepsy. In Sweden, rings were fashioned of mistletoe.

From time immemorial, invisibility has lurked in the secret thoughts of primitive peoples. Hazel nuts were potent in producing it, and heliotrope and fern seed were said to be able to confer it; but, if you had fern seed, it was sometimes thought that snakes would chase you until you dropped it. Swiss peasants believed that an Ascension Day wreath of amaranth could make the wearer invisible.

Then there were plants said to make the invisible visible. Old tradition had it that, if a baptized person's eyes were anointed with green sap from the inner bark of the elder, that person would be able to see witches at any time, anywhere. If one wore rue on the person, together with agrimony, maidenhair, broom-straw, and ground ivy, one acquired such fine vision that witches could be seen.

Charms against evil were highly valued. Lavender counteracted the evil eye, while an ointment made of marsh mallow leaves was a German antidote for harm from witches. The Germans regarded the radish as an anti-witch plant. Some plants seem to have been double-acting, as vervain, which was a counter-witch plant but also an ingredient in witch's brews. Witches also were said to employ mandrake, mullein, woodbine, and hemlock root dug at night, and were thought to like foxgloves and harebells and to dislike bracken fern, yew, and clover, as well as yellow or greenish-colored flowers.

Folk looked upon bulrushes,

reeds, cornstalks, broom, and ragwort with something akin to awe, because they could change into horses if bestrode by witches. Fairies had steeds, too, in the popular belief. Fairy steeds were cabbage stalks, ragwort, fern fronds, and blades of grass or straw, while some fairies rode in nut shells. A cowslip was a fairy cup, and a tulip was the cradle of a fairy baby. The four-leafed clover enabled its wearer to detect the presence of fairies, and was found only in fairy haunts. Fairy rings of toadstools were places where the fairies danced. Ferns and fairies seemed to have a mysterious bond, while roses were thought to be under the special protection of dwarves and elves. The globeflower, or trollius, was a troll flower—trolls lived in caves and hills, and were malignant.

Should you henceforth look askance at the flourishing trollius in your garden? No; you should let your Christmas rose, or black hellebore, counteract it; for it has the reputed power of putting devils to flight. Artemisia and peonies also share that gift.

The witch hazel is said to have derived its name through the use of its twigs as divining rods for water and minerals.

Every country had its love-charm plants. Myrtle was said to create and preserve love. Endive seed, cumin seed, the root of male fern, cyclamen, purslane, crocus, and periwinkle were potent love plants, while mandrake and vervain were love philtre ingredients, and water lily was the proper antidote to infection by amour.

Old Wallachian fancy gave every flower a soul. These people believed the water lily was the sinless flower of the lake, which bloomed at the gates of Paradise to judge the rest of the flowers, and that she would require an accounting of what they had done with their odors. South Sea islanders say that scent is the spirit of a flower, and that the dead are sustained by flower fragrance. They cover new-made graves with sweet flowers, and believe that Bolotoo, an island of gods and souls, is an earthly paradise. Bolotoo is said to lie in the ocean, northwest of Tonga, and has beautiful fruits and flowers that come anew as soon as they are picked.

Fables have risen about the blood of the slain or injured, blood that has sunk into the ground, and from which have sprung flowers or plants. In Mexico, marigolds became known as death flowers at the time that Spaniards shed so much blood in their search for gold, and Virginia Indians said that red clover sprang from the blood of battle-slain warriors. English Dane weed, the dwarf elder, came from Danish blood. Red poppies appeared on the battlefields of Europe after Wellington's victory over Napoleon. Lilies of the valley arose from the blood of St. Leonard, who, in St. Leonard's forest in Sussex, for three days fought a fire drake or fire-breathing dragon. Although badly wounded, St. Leonard was the victor. Attis' blood produced violets.

The globeflower was once thought to harbor trolls, malignant spirits that inhabited caves and hills.

Dream plants held a niche in the superstitious mind. The elm was a prophetic tree or tree of dreams, and the Russian pasque-flower was a dream herb. Four-leafed clovers, daisy roots, and yarrow put under the pillow at night were said to bring dreams of a future mate, while to dream of clover meant a happy marriage and prosperity. To dream of white flowers meant death.

Primitive folk used drugs and narcotics to produce prophetic dreams. South American Indians gave narcotic drinks to their seers to get wanted information from their dreams, while California Indians did likewise, but gave the potions to their children. Darien Indians used the seed of a species of datura to produce delirium.

Plants of good omen were the rose, lily, thistle, wormwood, currant, pear, olive, jasmine, and palm tree. Plants of evil omen were the plum, cherry, walnut, hemp, cypress, dandelion, and withered roses, while beans were said to portend evil.

The imagination of mankind has never been idle, and even the myths and legends sponsored by members of the plant world would fill a sizable volume. Then, too, there are the old proverbs, many of which draw on plants for their inspiration, and many of which are as valid today as they were centuries ago. One such proverb that seems to furnish food for thought in our modern era of international turmoil runs like this: "He that goes barefoot must not plant thorns!"

COURSE OF NIGHT

Evening pricks the wedgewood sky
With instant points of glinting light.
Inside the night the aspen leaves
Talk with winds that walk the eaves.

Earth and sky sleep merged until
The pine is outlined, then the hill,
And up from purpling pools of night
The dawn lifts stars on spoons of light.

Paul Osborne Williams

"Rabbit ice" extends along this plant from the ground line to the crown leaves. It sparkles in the early morning light, but melts as the temperature rises.

"Rabbit Ice" of the Ozarks

By TOWNSEND GODSEY

Photographs by the Author

As SUDDEN in its appearance and departure as a summertime mushroom is "rabbit ice," the strange winter phenomenon of the Ozark Mountain country. Plant, temperature and barometer must be precisely right for the conditions that produce rabbit ice, and few have ever seen this beautiful and delicate formation more than once in their lifetimes.

At first glance, the patches of rabbit ice give the host plants the appearance of having caught blowing tufts of cotton from a burst mattress. As seen from above, they look like carnival cotton-candy on sticks. And on close examination, many of them look like the tissue-thin curls of shavings that are produced when a sharp plane is passed over a poplar board. The ice is pure white, without stain, and is highly reflective. Usually the heaviest formation is at ground line, but the ice may extend the full length of a plant.

Weather conditions that bring rabbit ice apparently must be exactly right. In every observed instance, the ice has appeared on a cold morning (twenty-five degrees or less), when the barometer is high and there is rapid radiation under clear, calm skies. The ice forms sometime before sunrise, and usually is gone soon after the plant is warmed by direct sunlight. Shaded plants playing host to rabbit ice may keep their decorations until mid-morning.

Oddly enough, the phenomenon may repeat itself on the same plants more than once during the season, providing weather conditions are favorable. Although a plant has the appearance of being dead and has previously been split open by the rabbit ice, a similar formation may appear again, just as heavy and just as beautiful as the first. The ice may be removed under gentle pressure, although it crumbles rapidly and melts soon after contact with the hand. It may be crushed like fine talcum powder if you are able to act quickly before it melts.

Native Ozarkians long have known about rabbit ice, although only a few have observed it more than once or twice in their lifetimes. Children and their elders have been known to gather and eat the ice, and one old-timer likened it to swamp-root. As the horse mint on which the ice is often seen is a carminative, it is possible that the ice may, in fact, have qualities soothing to a growling stomach.

The cause of rabbit ice is a local mystery, at least. It

As seen from above, patches of rabbit ice sometimes look like the cottony candy-on-a-stick that is sold at carnival concessions.

is speculated that it may come from sap left in the stalk after earlier fall frosts, or from sap that has risen in the stalk following warm days that precede the required temperature and barometric conditions. As the formation appears most frequently near the ground line of the plant, it might be possible that the sap or moisture in the upper root system is frozen under pressure. It seems to make little difference whether the host plant is intact from root to crown, or has been severed by a mowing blade—the rabbit ice forms just the same. Not all plants in a given area are affected by the ice.

Plants on which the rabbit ice usually appears are large-stemmed, and grow on thin-soiled limestone ledges that receive considerable moisture. In the accompanying photographs, the plant on which the ice appeared is one of the composites, although naturalist C. C. Williford, a retired government meteorologist for the Ozarks, reports it to be most common on the horse mint.

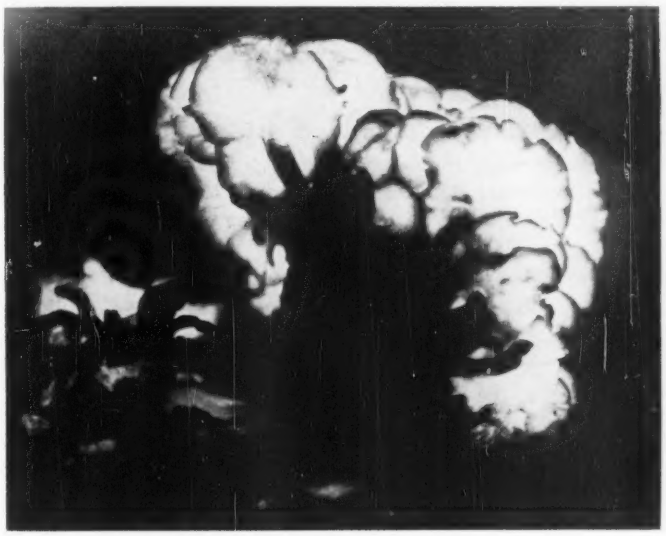
Ozark folklore fails to reveal the reason for the name "rabbit ice," although some believe that old-timers may have seen rabbits nibbling the ice, and may have given it that name. Meteorologist Williford once referred to the formations as "ice orchids." In his twenty-five years as a meteorologist at Springfield, Missouri, he saw "ice orchids" only twice. As a result of a radio broadcast mentioning the ice formations, he received more than twenty letters from old-timers in different sections of the Ozarks who had at some time in their lives seen the odd formations.

The area in which these photographs were made is in The Shepherd of the Hills country of the White River, along the Missouri-Arkansas border.

Ghostly Glow

By VICTOR H. HUTCHISON

Photograph by the Author



This photograph of a clump of *Polyporus sulphureus*, the sulphur shelf mushroom, leaves no doubt as to the luminescence of some specimens. The picture was taken with an exposure of eight hours.

WALKING in the woods at night, one occasionally may see a faint glow of light being emitted from a dead log or tree, or from decayed areas at the bases of living trees. Upon close examination, the inquisitive usually will find a fungus as the source of the curious phenomenon. These funguses have long formed bases for ghost stories in many lands.

Many funguses and several bacterias, as well as numerous animals, are known to be bioluminescent, but a complete scientific explanation of how this "cold light" is produced has yet to be made. If man could but discover how to produce light in the same way, a very efficient lighting system might follow.

One of the more common edible mushrooms is the beautiful sulphur shelf mushroom, *Polyporus sulphureus*, that grows on rotten logs and standing trees. Oaks are the favorite hosts, but they occur on many other hardwoods. The colorful orange and yellow rosettes of this mushroom form clumps with many overlapping, fan-shaped shelves. The clumps often weigh several pounds, and the informed mushroom collector knows that properly cooked sulphur shelfs make a delicious meal. He knows also that once a clump has been found, he can return to the same spot year after year, since the fungus decays the heartwood of the trees, producing new shelves on the exterior of the tree every year.

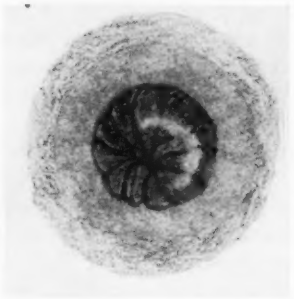
The luminescence of this mushroom was first described by a botanist, W. G. Smith, in 1871; but the famous mycologist, A. H. Reginald Buller, cast some doubt on Smith's observation. In his *Researches on Fungi*, Buller stated that he had been unable to detect any luminescence in the sulphur shelf fungus, and that an examination by qualified botanists was needed to verify this.

The accompanying photograph of a clump of sulphur shelf mushrooms taken by its own light leaves no doubt as to its luminescence. The clump measured approximately eighteen inches in diameter, at the top. The photograph was taken in a darkroom with a 35mm camera, and required an exposure time of eight hours. After entering the darkroom from a brightly lighted hallway, it required ten or fifteen minutes to detect the glow; but after twenty minutes, the eyes became dark-adapted, and a watch dial was easily read in the light emitted by this luminous plant.

The "Bug" That Is Not a Bug

By BEULAH WOODS ALLEN

Illustrations by the Author



Under strips of decaying bark and fallen leaves you will find the pill bugs, the strange little animals that scientifically seem out of their proper element. Commonly known as pill bugs, sow bugs and armadillos, the little creatures have a remarkable facility for rolling themselves into lead-colored, armored balls.

THE DAMP, dark places that the bugs-that-are-not-bugs call home are usually under boards, rocks, the loose bark of trees, and fallen leaves. On their abdominal legs minute tubes, like tiny gills, especially adapted for breathing moist air, line up side by side. Usually scavengers of decayed vegetable life, they sometimes show a preference for living plants, doing great damage when their numbers are especially great.

Their habits are bug-like, and by their habits we are supposed to know them. But they are not bugs. All bugs, or insects, have three pairs of jointed legs. These have nineteen pairs! Insects have one pair of antennae. These have two pairs—one short and one long pair.

In some localities, these strange creatures are known as armadillos, their scientific name being *Armadillidium vulgare*. They cannot qualify as mammals, for they lack the necessary backbones, and lay eggs instead of giving birth to their young. However, like the quadruped for which they are scientifically named, they sport an armadillo-like armor, although it is compounded of different ingredients. Their plated armor is really a combination of protein and chitin. They have the armadillo's remarkable facility of rolling themselves into a ball, so as to expose nothing but the plates of the back.

It was when found in this interesting position, resembling nothing more than a doctor's pill, of a dull leaden hue, that some authorities contend they were given the name pill bug. There are others, however, who disagree, contending the name was adopted because of the bugs' reputed medicinal virtues. For there was a time when they were dispensed as pills, and swallowed whole, as a ready-made pill. Have you had your medicine today, or are you suddenly feeling better?

These little creatures resemble still another set of mammals, the marsupials, the family noted for its built-in pouches. Like the female opossum and kangaroo, the female pill bug carries her eggs, after they are laid, in a pouch that is formed by overlapping plates attached to the bases of her first five pairs of legs. The young are hatched from the eggs in their full form, resembling adults in miniature.

Confirmed non-conformists, pill bugs differ in still another way. They do not grow gradually, as animals grow, a little each day. They go on a growing spree, as it were, and put on a whole year's growth in about two days! And at this time they moult their plated armor.

The protective armor is lifeless. Without cells, it is compounded and recompounded by the underlying living tissue, yet is never a part of that tissue. Since this outer covering is without life and cannot expand, it must of necessity be moulted, so long as the pill bug continues to grow. A new armor of proper size is soon compounded by the now larger pill bug. The empty one is left lying where the crustacean stepped out of it, and resembles a cast made of murky plastic.

If pill bugs are neither bugs nor mammals, then, pray tell, what are they?

These pill bug-armadillos, with "marsupial" tendencies, are little isopod crustaceans. Oddly enough, they are first cousins of lobsters, shrimps and crayfish. It is believed that pill bugs, like their relatives, once lived in water. Landlubbers though they now are, they breathe air through gills, before it reaches the respiratory organs, located beneath the anterior plates, which are perforated with holes like a row of tiny pin pricks.

What a paradox! A terrestrial crustacean, commonly called pill bug, and scientifically named *Armadillidium vulgare!*

EYE-WITNESS

By Gladys De Nio

On inland trees of field and town
Deep roots perhaps may grow;
But birches, where the lake begins,
Are shimmering, leafy, silver twins,
Above ground and below.

So silent, swift, our boat slipped by—
Yet, this, I swear I did espy!
And in that shining row,
Hoof lifted, poising upsidedown,
There stood a startled doe!

The new Sydney H. Coleman Animalport of the American Society for the Prevention of Cruelty to Animals is the first stop-over in the United States built exclusively for animal air travelers, and is at the Cargo Center of New York's International Airport.

America's First Animalport

By ALDEN S. WOOD

Have you heard about the exclusive new hotel at New York's Idlewild Airport? Did you know there are superb accommodations for as little as twenty-five cents a day, including meals? And have you read about the unique payment system known as the "Animal Plan"?

But do not get too excited about this hostelry—you or I could not sign the register for twenty-five *dollars* a day. *We* are only people! And the guests at this hotel almost invariably have four legs, or at least two legs and wings.

I am writing about the Sydney H. Coleman Animalport, America's first hotel created solely to cater to the needs of animal air travelers. Located in the Air Cargo Center at Idlewild, the two-story structure cost $275,000 and was built by the American Society for the Prevention of Cruelty to Animals. It was dedicated and opened officially on January 29, 1958.

The Animalport's purpose is to provide examination, cleaning, feeding, watering, exercising, and sanitary care for animals in air transit, even during the shortest stop-over periods. It relieves the airlines from the responsibility of dealing with unusual animal problems that may arise, the possibility of injury, scratches, and bites to their personnel, and the chance of loss of live cargo on the ground. Open around the clock, it serves domestic as well as international animal air travelers.

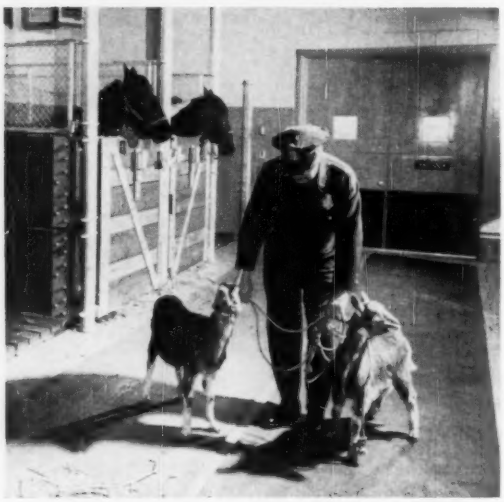
There is little doubt that the Animalport will be busy. During 1957 alone more than 100,000 different animals, including elephants, snakes, dogs, race horses, tropical birds, cats, monkeys, lions, and tigers passed through the aerial gateway of the world's largest airport. Many are shipped in from abroad as zoo specimens, some are pets, others are gifts, still others may be valuable show or race animals. As many as fifty cobras, whose venom is used in anti-venom medicines, have arrived in a single flight.

The name Sydney H. Coleman was given the shelter in honor of the late ASPCA executive vice-president who died March 23, 1955. He held that office from 1931 until his retirement in 1952.

America's first Animalport (the *world's* first is the "Airport Hostel," established earlier by the Royal SPCA at London Airport) is a handsome, 5000-square foot building that stands on one and a quarter acres of land in Idlewild's cargo center. The land has been leased for twenty years from the Port of New York Authority, which operates the airport itself.

The "animotel" leaves little to be desired by its specialized clientele or their owners. Except for a single office, its entire main floor is used for housing animals. The second floor, occupying space on one side of the building, is used as a residence by the resident manager.

Luncheon is prepared for the first animal arrivals in the Animalport's shining kitchen, where proper diets are available for any type of animal.



Early visitors at the Animalport included two horses and a pair of Nubian goats. The stable, with adjoining paddock, has 11 large horse stalls that can be converted to box stalls.

Within the first floor area, there are forty tiled kennels for cats, dogs, and other small animals. All have adjoining outdoor runs. For horses and other large creatures, eleven stalls (with outdoor paddocks) provide ample room. Tropical birds and animals whose lives depend upon warmth bask in temperature-controlled quarters, while near the ultra-modern veterinary clinic are isolation cages for animals that are sick or injured. A veterinarian is always on call, and ambulance service available. Animals may be kept for any length of time.

Among other services offered are the procurement of health certificates when needed, special diets when requested, pick-up and delivery of animals within a 50-mile radius of New York city, and crating directions.

A parking lot in front of the building can accommodate thirty automobiles and trucks. The loading area is indoors, and protects animals from rain, snow, heat, and cold. Even the largest trucks have no difficulties in this area, which measures fifty by thirty feet. Animals marked for stop-overs are unloaded from their airplane by a service company employed by the airlines. This company transports the animals to the cargo area where each airline has its own vehicle for moving Animalport-bound guests. Rates at this deluxe "hoss-tel" are under

COURTESY PAN-AMERICAN WORLD AIRWAYS

One of a pair of Indian elephants is led from a cargo plane after a flight half way around the world, from Bangkok, Siam, to New York.

An ASPCA attendant makes friends with a newly arrived monkey. The small animal and bird rooms are provided with temperature controls to suit the climatic needs of any animal.

the Animal Plan, of course, and offer some interesting contrasts. A turkey, pheasant, goose, or chicken may be boarded for a mere quarter a day, but carnivores like tigers are billed $4.00 daily.

Bed and board for equines averages $3.00 to $5.00 per diem; dogs rate between $1.50 and $2.50; cats, a dollar even. Snakes, however, are something else again. Usually shipped in quantity in bags, ophidians go for a modest fifty cents a day *if* they are non-poisonous. But a carton of cobras, for example, would double the price.

Keynote of the ceremony was the unveiling of a memorial plaque bearing the inscription "The Sydney H. Coleman Animalport of The American Society for the Prevention of Cruelty to Animals. Founded 1866." Said Dr. Goss, assistant director of the New York Zoological Society, "The movement of animals from the four corners of the world has become commonplace. Today greater distances are covered quickly, but not infrequently there are lay-overs. Also, abrupt changes in climate and surroundings are disconcerting to both wild and domestic animals. The impact of these changes can be alleviated via food, water, and shelter. It is here that the ASPCA is fulfilling its purpose in providing an animal Traveler's Aid Society in this fine shelter."

A Society veterinarian offers first aid treatment to a canine guest being shipped from the United States to Australia, one of hundred thousand animals that pass through the airport annually.

A veteran of 30 years' service in the field of mercy, this 1928 Graham unit still performs faithfully for the ASPCA in New York. It is a frequent visitor to the Animalport, transporting animals to the shelter when regular vehicles are not available.

Embroidery for the Roadside

By CHARLES R. KILBOURNE

Photographs by the Author

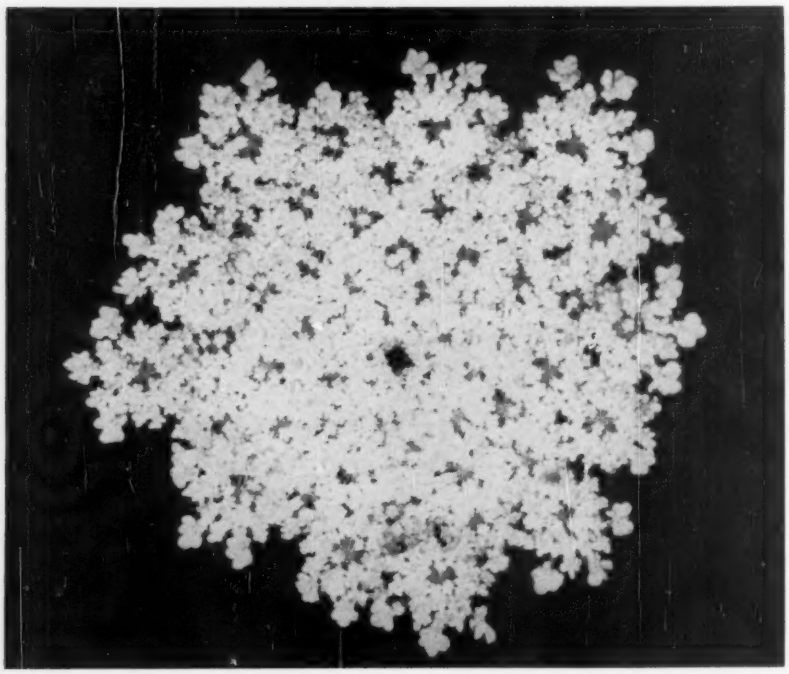
Throughout most of the summer, Queen Anne's lace may be seen in bloom along the country's highways.

WHAT SUMMER roadside scene would be complete without a decoration of Queen Anne's lace? Throughout most of the warm months the flat-topped blooms create endless white borders for country highways. In the United States, Queen Anne's lace grows throughout an extensive range that covers most of the country, although seeming to thrive most lustily in the States of the North and East.

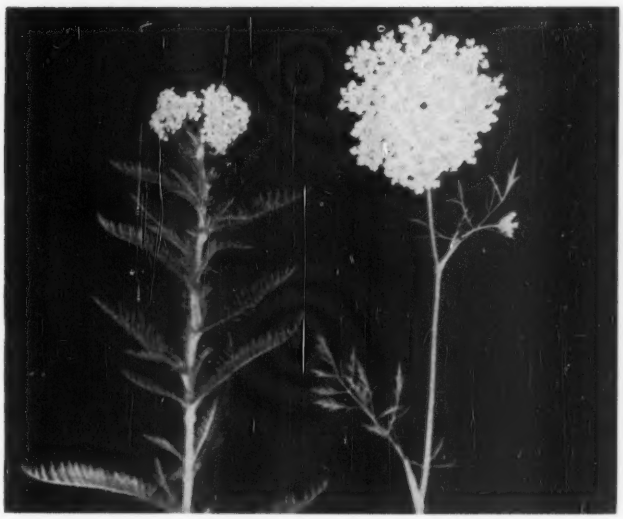
To the botanist, Queen Anne's lace is *Daucus carota*, while some of its other common names are the wild carrot (the garden variety of carrot was derived from this plant) and the bird's nest plant, in allusion to the form taken by the umbel as it passes from the flower to the seed condition, giving an impression of grandma's tatting.

In areas where Queen Anne's lace has become particularly abundant, it has been denounced by farmers—especially dairy farmers—as a vicious weed. Its prolific seeding habit and rapid rate of growth make for a quick invasion of the cultivated field, while the aromatic oil of the foliage lends an unwanted aroma to the milk of dairy cattle.

The naturalist and the plant enthusiast, however, are inclined to see Queen Anne's lace as a beautiful plant, with its finely-cut foliage and flat, white flower clusters, some of which sport a single dull-purple floret in their centers. They think it is a lace that truly is fit for a queen.

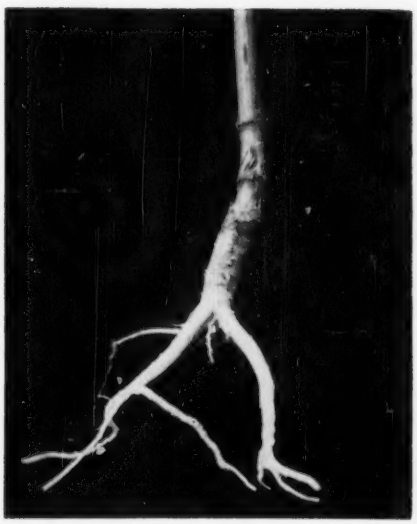


The flower head consists of a cluster of tiny white flowers which, when seen from above, somewhat resembles a pattern of carefully woven lace. In the center of most clusters there is a purple floret that is often mistaken for a small insect.



Queen Anne's lace often is confused with yarrow, at the left; but yarrow has a much more finely cut leaf and a flower that tends to be grayish-white.

As a flower head ages and begins to bear fruit, its edges tend to curl upward and inward, a characteristic that has bestowed on the plant one of its common names, the bird's nest plant.



A stout, woody taproot firmly anchors the plant against easy eradication, and has a bitter and rather faint carrot-like taste.
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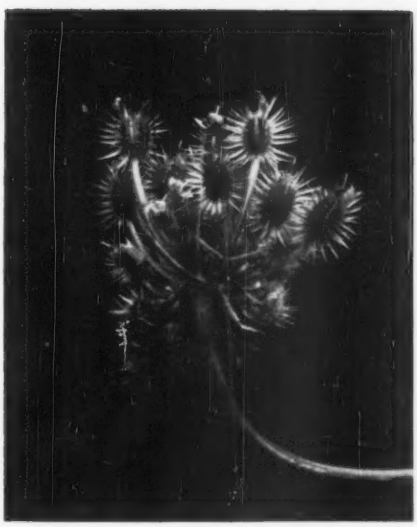
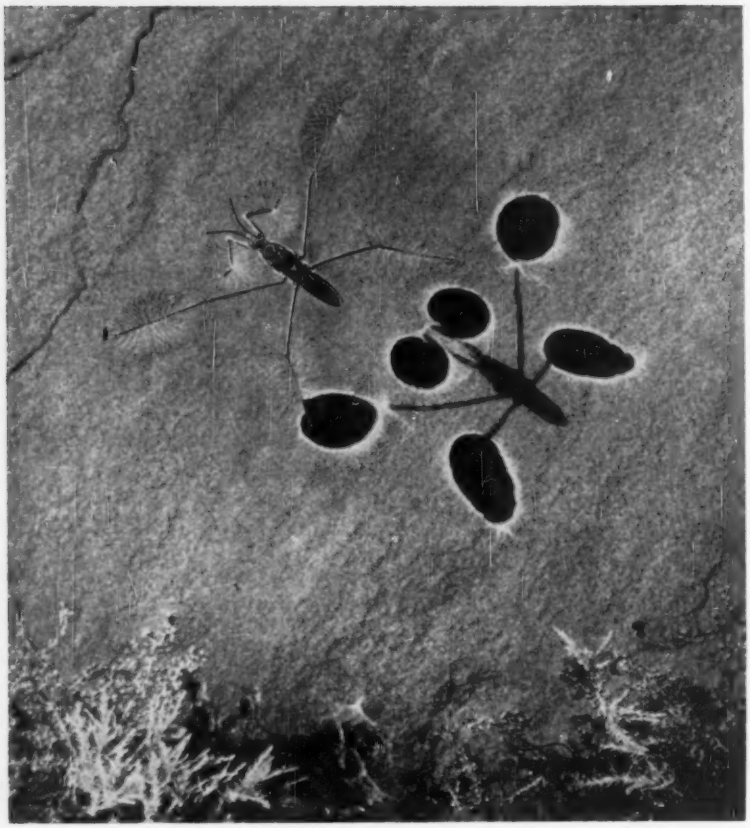
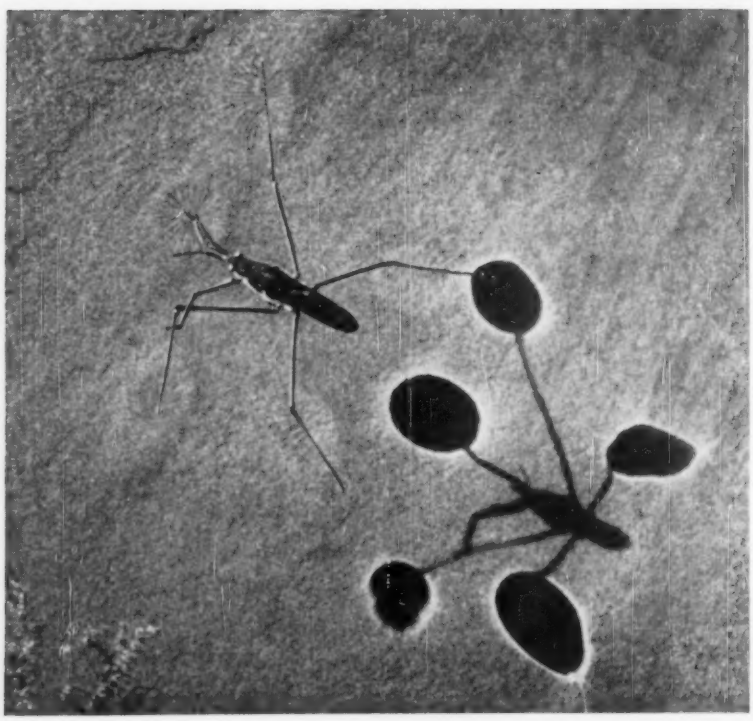
A cluster of small fruits from an old flower head suggest a group of tiny cocklebur in this enlarged photograph. Actually each fruit is only one-fifth of an inch in size.



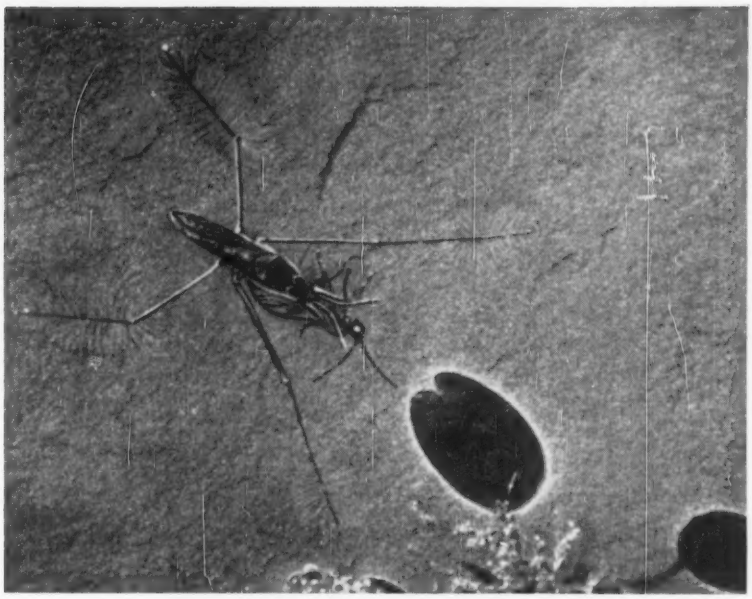


The water strider, *Gerris marginatus*, is shown with the "dents" it makes in the water and the "dog paw" shadow caused by bright sunlight. These have been photographed together, probably for the first time, by means of a suitable combination of sun and photographic lighting.

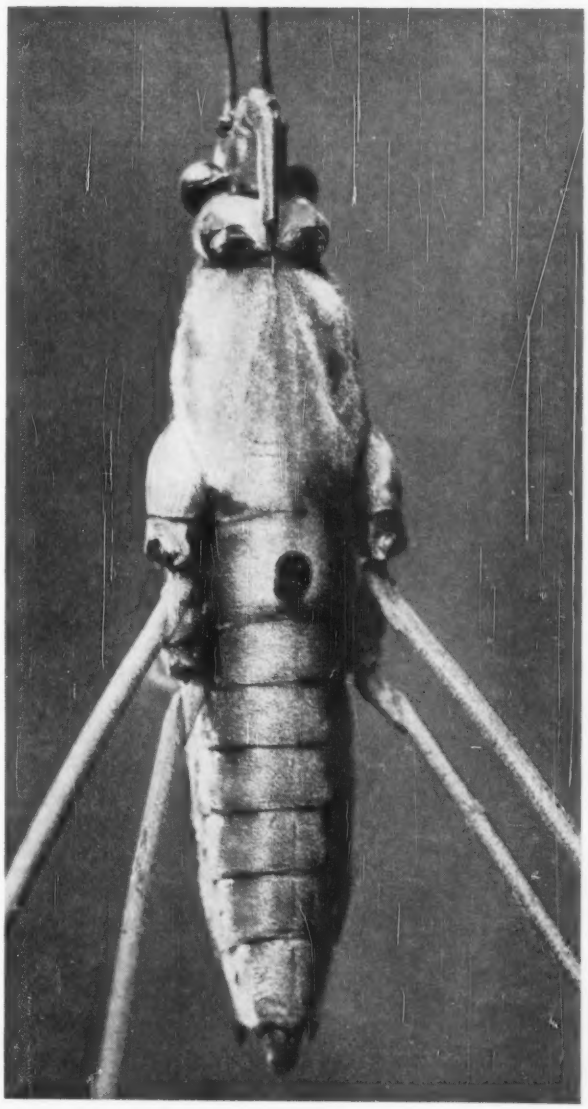
Substance and Its Shadow



The insect is "oiling" the row of bristles on the tibial segment of its leg. These become water repellent and make a corrugated depression in the surface. Such "dents" act like small lenses and focus bright rings of sunlight collected at the expense of the darkened central zones.



Gerris feeds on "shipwrecked" insects that come floating along. The tools of its trade are a beak and stylets designed for piercing and sucking. These, in addition to raptorial forelegs, leave a small insect struggling on the surface of the water little chance for escape.



The underside characteristics of *Gerris* include a beak, velvety pile, and glands supplying water repellent. There are two of the latter on the prothorax, and one on the thorax. This is a mounted specimen of *G. remigis*, with forelegs removed to uncover the mouth parts, photographed at a scale of X 12.5.

By H. LOU GIBSON

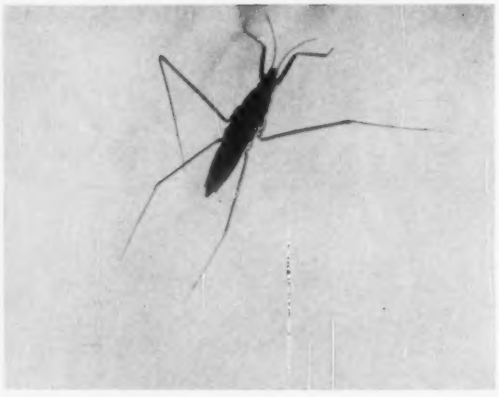
Photographs by the Author

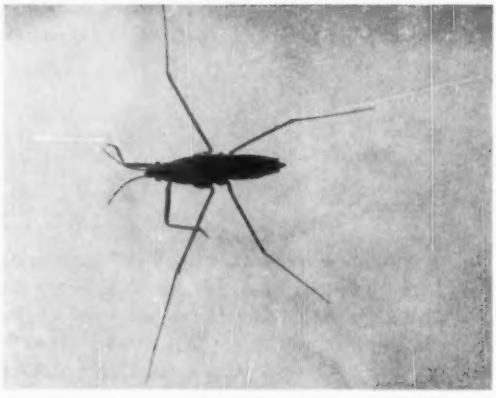
Most of us who have literally "gotten our feet wet" in Nature study by rambling along the banks of streams and ponds have been intrigued by the acrobatic gyrations of water striders. And those who have watched the insects in clear, shallow water have noticed the weird shadow that follows each around. The impression gained is that of a female being chased by a male on snowshoes! Actually, there is great scientific interest in the strider's support, and in the optics of its trailing banner.

These insects are not "spiders," as many people call them. They belong to the order of true bugs (Hemiptera) like squash bugs and cicadas. Their generic name is *Gerris*, and there are about twenty species in the United States. *G. remigis* and G. *marginatus* are the most common. The former is our largest, and is wingless, in contrast to its winged relative.

The most noteworthy feature of the strider is its ability to stay up on the surface of the stream. Anyone who has floated a sewing needle on a glass of water knows the principle involved. There is a "skin" of molecules at the water surface. The needle dents the water like a finger pressed against a toy balloon. A light-weight "hydrophobic" object remains unwetted, and does not break through; whereas a "hydrophilic" one becomes wet and does penetrate readily. It is this surface tension, and the curiously adapted legs of the strider, that enable it to do what comes naturally for striders.

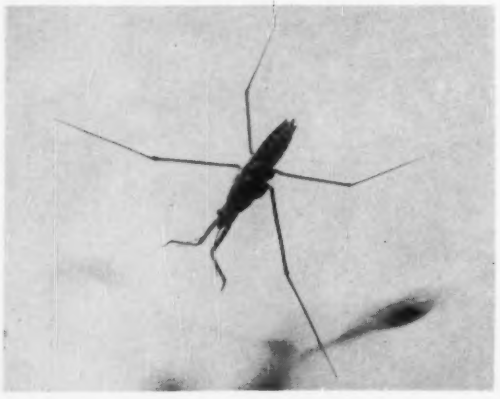
With household detergent in the water, the legs no longer resist wetting and the insect sinks. Only the true shadow remains because the "dents" have gone. The star-like flares are caused by tiny air bubbles held by the tarsi. (These probably have not been observed before; similar bubbles, trapped by the middle and rear femoro-tibial joints, have washed away here.)





A living *G. remigis* is photographed in a petri dish of water to study preening actions. On the left, the tarsal segment is used to pick up the water-resistant substance from glands on the femur and to brush it on the tibial bristles. On the forelegs (photograph at right) the tarsi are "oiled" and this is done from the glands on the prothorax.

G. remigis at rest, (at left) and in rapid motion (at right) photographed with electronic flash. The corrugated dents and the hydrophobic fields around the bubbles (shown in previous pictures but not possible to record here) give the insect a foothold on the water. When in motion, the fore and hind legs are held parallel to provide rudders, while the middle legs do the rowing.



The First Hurdle Cleared

When, on April 16, President Eisenhower signed into law an amendment to the Federal Highway Act of 1956, the first hurdle in the race to control outdoor advertising along the Interstate Highway System was cleared. There are forty-seven more hurdles to clear before protection of the vast public investment in this system can be achieved—forty-seven because Maryland is the one State that has taken strong action to protect its mileage. In approving the bill the President urged that Congress strengthen the billboard control provision.

By a margin of six votes in the Senate and by a vote of 222 to 109 in the House, the Congress rejected moves to strike out the billboard control provision. Thus it was established as National Policy that the safety, convenience, and enjoyment of public travel and the free flow of interstate commerce, as well as the protection of the public investment, require control of "the erection and maintenance of outdoor advertising signs, displays, or devices adjacent to the system."

However much the actual provisions of the Act may have been watered down by some amendments that bore the indelible fingerprints of the outdoor advertising interest, the measure unequivocally stigmatizes outdoor advertising along this Interstate System as undesirable. This is, then, a victory in the public interest and despite the activity of the well-heeled billboard lobby.

Corollary to, and equally important with the declaration of national policy is the provision that the Secretary of Commerce is directed to prepare and promulgate national standards affecting outdoor advertising devices. The policy and the standards would be binding upon the States entering into agreement to control billboards on the mileages of the Interstate System within their borders. The importance of these standards is emphasized in the Act by the statement that allowable exceptions must not be inconsistent with the national policy and standards.

Undoubtedly the most crippling amendment was proposed on the Senate floor by Senator Francis Case of South Dakota, who had been a friend of control from the start. In Senate committee he had fostered an amendment that would have permitted signs not exceeding 500 square inches and advertising activities being conducted at a business location within twelve miles of the point at which the signs are located. On the floor he succeeded in having the size limitation eliminated. Thus, unless the national policy and standards are strongly stated, there would be no limitation upon the size or number of signs that could be erected within a twelve-mile distance of a spot where activities advertised are being carried on.

Assume, for example, that there are fourteen motels, nine filling stations, six eating establishments, three garages and four manufacturing plants reachable through an interchange twelve miles distant. Unless the national standards prevent this flouting of the manifest public desire, such establishments could erect innumerable competitive signs along this twelve-mile stretch. Indeed, existence of a Coca Cola vending machine in a filling station at the interchange might be interpreted as allowing Coca Cola, one of the worst offenders in roadside advertising, to put up all the signs they desired on the twelve miles of highway environment. The national standards *must* anticipate such situations and prevent their development.

Senator Cotton of New Hampshire, also a consistent friend of control, had adopted another crippling amendment. His proviso was that control would apply only to rights-of-way acquired subsequent to July 1, 1956. The effect of this is to perpetuate billboards on any mileage of the Interstate System that included the widening and improvement of an old route. This is likely to be a substantial mileage.

Perhaps in partial atonement for his other amendment, Senator Case proposed, and had adopted, provision that segments of the highway not conforming to national standards should not be considered in computing the extra Federal incentive contribution of one-half of one percent to the States. The effect of this is that the more the controlled mileage the more incentive money available.

If the national standards are well-considered and specific, and carry into effect the public's wish for protection, then these weaknesses of the Act may be largely overcome. If the national standards recognize the right of purveyors of services of food, fuel, habitation or other essential services to announce themselves either through uniform and official signs, travel information areas, roadside rest "bulletin boards" or otherwise, then the water in the Act will not inundate its real intent. If a system of official signs, or quasi-official signs under control, is established the result would be beneficial to the advertiser and the traveler, and would assure safe and pleasurable travel.

Whatever results as spelled-out national policy, final decision rests with the States. Most State legislatures meet in 1959. Then laws must be enacted on a State level; effective laws like that in Maryland, which provides for real control. State laws do not need to be tailored to the minimum requirements of the Federal Act. If the protection desired is to be attained such laws should be stronger. They will be fought by the outdoor advertising industry, make no mistake. These interests have ample funds for such State battles.

However, members of State legislatures are just as responsive to the people who elected them as were the members of Congress. To support effective State legislation members of garden clubs, conservation organizations, motor clubs, architects, nurserymen, farm groups, and an aroused army of individuals can join on a State level to accomplish real results, just as they did on a national level. The time to start is *now*.

Wheeler Peak rises 8000 feet above the desert valley, and in the five miles from the base to the summit are to be found all the climatic and vegetational changes that would be encountered in a 2600-mile trip to northern Alaska.

Nevada's Wheeler Peak and Great Basin Range—

A Possible National Park

By WELDON F. HEALD

Photographs by the Author unless otherwise credited

PHOTOGRAPH BY LOWELL SUMNER

An aerial view shows the newly discovered glacier and the sheer, unbroken face of the peak rising 1780 feet above it.

In 1955, a hitherto unsuspected active glacier was discovered in a deep, hidden cirque high up on Nevada's Wheeler Peak. This triangular body of moving ice, measuring 2500 feet to the side, is probably the only one in the entire Great Basin region, between California's High Sierra rim and the Rockies. It has been named the Matthes Glacier after Francois Emile Matthes, who was one of the country's great geologists and glacial experts.

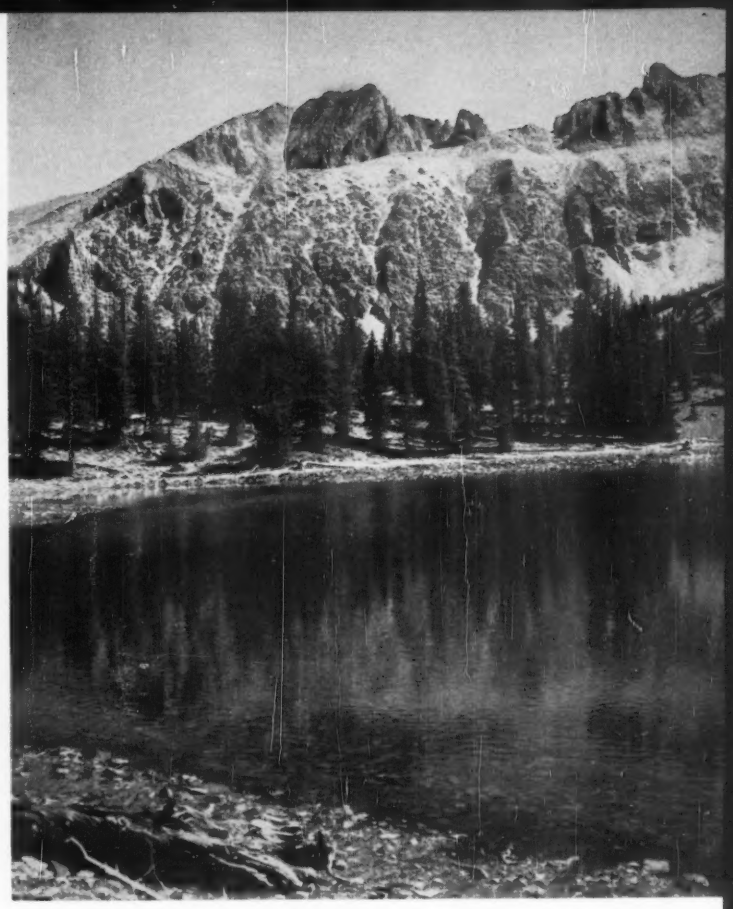
The finding of permanent ice in the midst of

"The Great American Desert" was somewhat surprising, and served to focus attention on the region. Although little known, investigation revealed it to be so outstanding scenically, geologically, botanically and climatically that it is worthy to be included among the superb examples of original America in our national park system. In fact, one well-informed visitor from Washington, D. C., declared that "the Wheeler Peak area has a greater variety of outstanding scenery than any existing national park." As a result, an active campaign is under way to create the "Great Basin Range National Park," and many outdoor and conservation organizations are enthusiastically endorsing the project. Bills to establish the park will be introduced in both House and Senate by Nevada legislators during this session of Congress.

Wheeler Peak rises to an elevation of 13,063 feet, and is Nevada's second highest mountain. Its lofty, wedge-shaped crest is visible for miles in every direction, and is the culminating point of the great Snake Range, which stretches north and south for eighty miles, just west of the Utah line. Although representative of the distinctive basin-and-range topography typical of Nevada, Utah and adjoining States, these mountains are perhaps the most spectacular of them all. As such, they are the supreme example of a type of Western scenery now lacking in our national park system.

Soaring 6000 to 8000 feet directly above the surrounding country, the Snake Range exhibits a startling contrast to the broad desert valleys below. In a horizontal distance of five miles, from base to summit of Wheeler Peak, are telescoped all the climatic and vegetational changes you would encounter on a 2600-mile journey to northern Alaska. Here, five of North America's seven life zones are stacked one above another, like layers in a multi-layered cake. First are the treeless sagebrush valleys, then a belt of pinon-juniper woodland. Above that is the pine and fir forest, changing at higher elevations to spruce and aspen, and beyond timberline the barren Arctic-alpine zone sweeps up to the highest summits.

With this amazing botanical diversity, its rugged mountain setting, and the vast stretches of desert below, the Wheeler Peak area is hardly surpassed in scenic magnificence anywhere. Included are deep canyons and startling rock formations; precipitous cliffs and pinnacles; jagged, snow-flecked peaks; surprising forests of wide extent; gem-like mountain lakes; cascading streams and park-like meadows spread with wildflowers. Some veteran pines are thirty feet in circumference, aspens grow to a diameter of three feet, and the area contains the largest mountain mahoganies in the country. Altogether, there are eleven different species of conifers, and nearly forty varieties of broadleaf trees have been listed, while the types of plants



Stella Lake, above, lies in a grand setting among the rocky peaks near timberline, while, below, a dead bristlecone pine is a relic of a warmer era at the entrance to the great north cirque, with Matthes Glacier beyond. This is the only known true glacier in the Great Basin region.

↑ Wheeler Peak looks down over the alpine basin at the head of Lehman Creek, and north to Sacramento Pass. Stella and Theresa lakes lie 3000 feet below the summit in old glacial cirques.

← This is Emerald or Johnson Lake from the divide, looking down Snake Creek to the deserts and mountains of Utah.

range from desert growths like cactus to arctic willow.

Wildlife, too, is abundant, and almost undisturbed by man. Bands of antelope roam the surrounding valleys and foothills. Mule deer are plentiful and elk are sometimes seen. Mountain lions and bobcats are fairly common, while the higher peaks and ridges are the home of the Canadian species of bighorn sheep. There also is a great variety of smaller mammals and birds. Streams on the east side are well stocked with trout, and Treasure Lake has the reputation of yielding an occasional "lunker."

Geologically, the Snake Range is a fascinating outdoor museum. It is a huge fault block of massive quartzite interspersed with beds of limestone and granite thousands of feet thick, and in the higher elevations the rock is profoundly sculptured by Pleistocene glaciation. The present-day active glacier, too, with its bergschrunds, crevasses and moraines, adds to the interest. On the east side, at the foot of Wheeler Peak, is Lehman Caves National Monument. This one-square-mile Park Service

reservation was created in 1922 to preserve a small but exceptionally fine limestone cavern. There is probably no known cave on the continent containing a greater concentration of intricate and complicated formations, and it is considered by many to be the most beautiful in the country.

With its ease of access and the expanded visitors' facilities planned by the Park Service, Lehman Caves would form the nucleus and headquarters for the new park. Already there are cabin accommodations, restaurant, picnic grounds, and nearby campgrounds and trailer park. The mountainous area is too rough and restricted for extensive road and resort development, and would best be preserved as a stimulating wilderness for camping, hiking and horseback riding. Precedents for this kind of national park, in which the major parts are left untouched, with the exception of trails and shelters, are Grand Teton, Kings Canyon, Olympic and others. Furthermore, it is an easy, comfortable sort of wilderness, with no section far from a road-end, and most points of interest may be visited in one-day round-trip hikes or horseback rides.

At present the Snake Range is within a detached division of Nevada National Forest, and its administration is excellent. However, the United States Forest Service's multiple-use policy means that hunting, livestock grazing, mining and limited lumbering are permitted. As a result, the area is already showing (*Continued on page 330*)

Spruce and alpine meadows among the rugged peaks of the Snake Range that stretches north and south for eighty miles just west of the Utah State line.

Wheeler Peak towers 4000 feet above park-like meadows and forests of pointed spruce.

Sanctuary on the Chickamauga

PHOTOGRAPH BY MRS. FRAN W. HALL

Robert Sparks Walker, on the left, executive director of the Chattanooga Audubon Society that operates the Elise Chapin Wildlife Sanctuary, with Fran William Hall, screen tour lecturer for the National Audubon Society, for whom a tree in the sanctuary's Literary Acres has just been christened.

CHATTANOOGA, Tennessee, is a city rich in the relics of the War between the States, and you can not go far in any direction without encountering a sign, monument, or tablet that commemorates some incident in that part of the struggle that swirled through the mountain and valley country of the southwestern Appalachians. Not far south of the metropolitan area is the checkerboard pattern of the Chickamauga and Chattanooga National Military Park. Indeed, the city of Chattanooga, and its surroundings, might be likened to a vast sanctuary for the preservation of the memories and mementoes of the Civil War.

East of the Missionary Ridge, on the highway that takes you from Chattanooga to Knoxville, a blacktopped road turns off to the south—it is called the East Brainerd Road—twisting its way toward the hilly country of north Georgia, not far distant. If you follow this road for about three miles, you will see, at a "four corners," a small sign on your right that points to another kind of sanctuary in which living things, rather than memories and relics, are being preserved for the enjoyment and study of the public. It points out the road to the Elise Chapin Wildlife Sanctuary, owned and operated by the Chattanooga Audubon Society.

Fourteen years ago, the Chattanooga Audubon Society, newly organized under the energetic leadership of executive director Robert Sparks Walker, acquired an initial hundred and five acres of land on both sides of Chickamauga Creek for the establishment of a sanctuary. The primary purpose of the Society was to provide a refuge for birds; but the founders felt that it might provide a sanctuary for humans, as well—a living museum where, in the words of Mr. Walker, "people of all ages might go at any time, study Nature, re-create themselves, and clean the cobwebs from their brains." Within the protected acres, all native living things—with the exception of "mosquitoes, gnats, ticks, and chiggers," director Walker qualifies, a bit mischievously—are as safe as it is possible to make them.

The drive to the sanctuary from East Brainerd Road

To the left of the hard-surfaced road that leads into the sanctuary is "Wood Thrush House," home of the caretaker and his family.

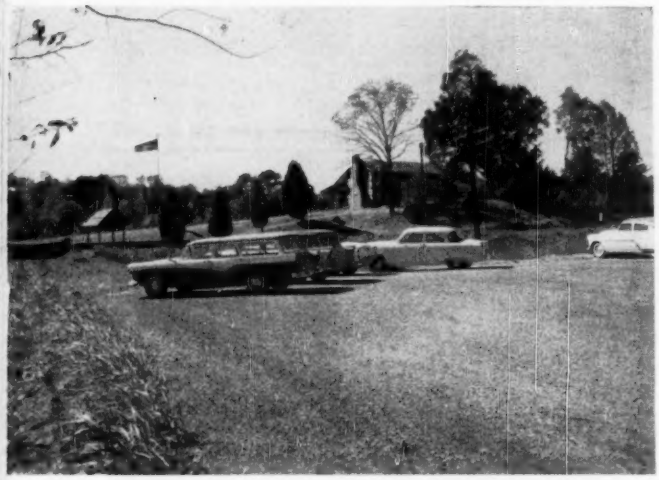
is by way of less than two miles of relatively new highway that has been graded and paved by Hamilton County, so that visitors may reach the area in all weather, every month of the year. Along both sides of this entrance road, members of the Third District of the Tennessee Federation of Garden Clubs have recently started setting out young dogwood, crabapple and redbud trees, as part of a two-year planting program. At the end of the drive, visitors reach a spacious parking area, also paved, where they leave their cars and cross the single track of the Louisville and Nashville Railway (the old Western and Atlantic road of Civil War fame; the doughty Captain Andrews and his raiders were taken just five miles south of the sanctuary), and so to Spring Frog Cabin, focal point for activities at the Elise Chapin Wildlife Sanctuary.

Last year, more than thirty thousand people signed the register at Spring Frog Cabin. There were bankers,

By PAUL MASON TILDEN

Photographs by the Author unless otherwise credited

Brownies, naturalists, Boy and Girl Scouts, bird enthusiasts, and people of no particular classification who simply had abandoned city streets for a few hours of quiet communication with Nature. They were at liberty to roam through the sanctuary (now grown by donation of land to a hundred and twenty-four acres) over any of the twenty-four Nature trails that offer more than eight miles of rambling, and to eat their picnic lunches at Loblolly Lunch Area under a cluster of tall loblolly pines near Spring Frog Cabin. For public enjoyment of



Visitors leave their cars at a spacious, paved parking area a short distance from Spring Frog Cabin, focal point for the sanctuary's activities.

the simple pleasures offered here, there is no charge whatsoever.

During a typical summer, Robert Sparks Walker, a competent botanist and ornithologist, conducts several Nature study trips a week through the area for groups of garden club members, university pupils, Boy and Girl Scouts, school children, and whoever else may wish to take advantage of a naturalist's interpretive services. A fair estimate of the number of people that Mr. Walker has led on such field trips in the past twelve years would probably be little short of a hundred thousand—and to the average visitor, the services of a naturalist-interpreter are a boon indeed. For in the latitude of Chattanooga, there is such a mingling of both northern and southern flora and fauna as somewhat to disconcert the casual observer, and the term "living museum," applied to the Elise Chapin Wildlife Sanctuary, is not misused.

For example, along the Nature trails of the sanctuary there are some 130 species of native trees and seventy-six species of native shrubs, many of which are labeled with both their common and botanical names for the benefit of non-group observers. More than 700 kinds of wild flowers have been identified here, and Dr. Edgar T. Wherry, professor of botany at the University of Pennsylvania and one of the country's outstanding authorities on wild flowers, has said that Wake Robin Hill, within the sanctuary on the west side of Chickamauga Creek, is one of the finest untouched wild flower areas to be found in the United States.

A casual study of the bird population of the sanctuary, conducted from time to time by a number of ornithologists, has resulted in the identification of not less than 180 species of birds, both resident and migratory, and the list is admittedly an incomplete one. The reptilian population includes at least twenty species of snakes, and there are painted, soft-shelled, snapping, mud, musk and box turtles, many amphibians, and all the small mammals usually associated with this latitude.

One of the highlights of the sanctuary, and a popular feature with the visiting public, are the three areas of land that have been set aside as memorials to American authors and naturalists, to military men of national fame, and to nationally known conservationists. Thus, in "Literary Acres," young trees have been set out, each planted and christened in the honor of such famous Americans as John James Audubon, Alexander Wilson, the noted naturalist-author and artist; the great Cherokee Sequoyah; Henry David Thoreau, Sidney Lanier, and many others.

In "Military Acres," trees have similarly been christened for many of our military men of fame, like General John Sevier, Andrew Jackson, and General Jonathan M. Wainwright, who spent a pleasant afternoon at the sanctuary. In "Conservation Acres" are trees that have been christened for many of the nationally known conservation leaders of the United States.

Robert Sparks Walker was born in Spring Frog Cabin, which was built by the Cherokee Indians about the year 1748 and finally became the Walker homestead.

The directors of the Chattanooga Audubon Society had realized, when the property was first acquired, that some sort of supervised protection would be necessary. The ideal arrangement would, of course, be a building within the limits of the sanctuary in which a resident caretaker could be installed, but such a building would cost more than the Society could afford. At least sixteen thousand dollars would be needed to erect a modern, comfortable home, attractive to the type of man the Society wanted. After some cogitation, Robert Sparks Walker sketched out a letter setting forth the problem, and sent it to a half-dozen of Chattanooga's citizens who were in a position to be of financial assistance. The response to this letter was most gratifying, and, in addition, word of the Society's project spread to other and equally generous quarters.

In May of 1953, the Society was able to hold open house at a modern and comfortable curator's dwelling—christened "Wood Thrush House"—situated on an elevated tract of ground not far from the entrance to the sanctuary, from whence the caretaker is able to survey almost the entire property without leaving the residence grounds. Today, both gunners who stray into the protected area and would-be vandals are politely but firmly moved out by a caretaker who is thoroughly dedicated to his job and who, with his wife and family, loves the sanctuary as deeply as do any of its sponsors.

Just beyond the southwest boundary of the sanctuary, on a two-acre tract of land overlooking Wake Robin Hill and an intervening meadow, the Chattanooga Council of Girl Scouts has built a lodge—appropriately entitled "Chickadee Lodge"—that is large enough to allow two troops of Girl Scouts to carry on their programs without interfering with each other, and with facilities for overnight occupancy. The land for the building was donated by two generous citizens of Chattanooga, and the Girl Scouts raised the money for the building themselves, with some friendly assistance from other interested citizens in the matter of supplies and labor. Here the Scouts and Brownies learn their Nature at first hand. They plant trees, attend guided trips over the sanctuary trails, wade and swim in Chickamauga Creek, and hold their religious services in the out-of-doors.

Perhaps the esteem in which the Elise Chapin Wildlife Sanctuary is held by the solid citizens of Chattanooga may be measured by their enthusiasm for a feature that has become a permanent part of the annual program. It is the Sunday morning breakfasts for business and professional men of the city. When thirty-five or forty business men are willing to get out of bed before six o'clock on a Sunday morning and drive several miles out into "the country" for a seven-thirty breakfast, they are evidencing a true interest in the purpose and the future security of the sanctuary. After a real country-style bacon and egg breakfast, the men walk the Nature trails with boyish pleasure.

When the weather cooperates, the breakfasts are held in the open air near Spring Frog Cabin; and when it does not, long tables are set up inside the ancient building. Spring Frog Cabin and executive director Robert Sparks Walker are bound together by close ties, for this building—said to be the oldest white-man-style Indian log cabin in the southern States—was Mr. Walker's birthplace.

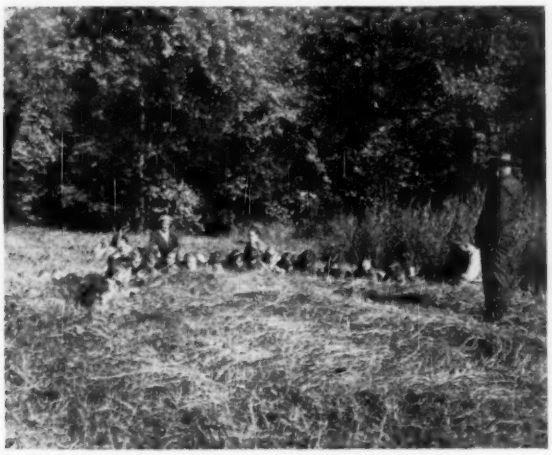
Spring Frog Cabin was built by the Cherokee Indians about the year 1748, and came into possession of the white man in 1838, after the Cherokees were driven westward from their Appalachian homeland. The cabin and its surrounding lands had been at one time the home and farm of the Cherokee Indian naturalist Too-an-tuh, known familiarly to the white man as "Spring Frog," and was bought by Mr. Walker's father during the latter half of the nineteenth century. Not long after the be-

A feature that has become a permanent part of the sanctuary's program is the Sunday morning breakfast for business and professional men of Chattanooga.

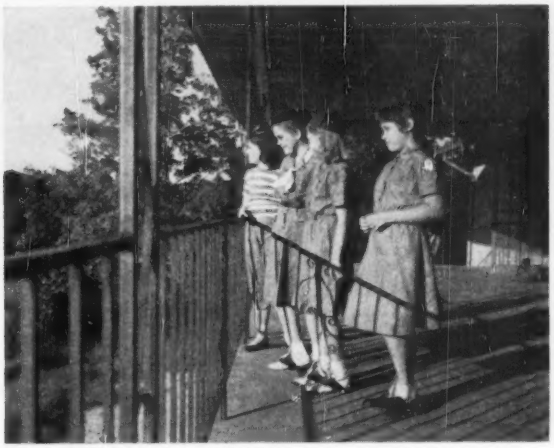
After a country-style breakfast, the businessmen walk the trails of the sanctuary with director Walker (at left) who conducts the Nature interpretation.

ginning of the second World War, the time arrived when the Walker estate had to be settled, and it was then that the idea of converting the family homestead and acres into a wildlife sanctuary first occurred to Mr. Walker.

The other heirs to the property were interested in Mr. Walker's plan, also; so much so, in fact, that they agreed to a settlement that was far less than the property might otherwise have brought in the hands of a capable



A troop of Brownies, with its adult leader, forms a semi-circle around Robert Sparks Walker to hear him tell a children's Nature story.



Just beyond the boundary of the sanctuary, Chattanooga Girl Scouts have built "Chickadee Lodge," with facilities for two troops of Girl Scouts.

real estate agent. Thereupon, Mr. Walker and eight other interested persons organized the Chattanooga Audubon Society for the purpose of establishing a wildlife sanctuary on the Walker farm. Through the generosity of Mr. E. Y. Chapin, president of the American National Bank and Trust Company—a Nature enthusiast as well as a successful banker—purchase money was forthcoming, and in 1945 the directors of the Society were able to christen the area the Elise Chapin Wildlife Sanctuary, in honor of the wife of their benefactor.

Most of the visitors who go with Robert Sparks Walker through this beautiful preserve find it difficult to believe that the kindly, energetic founder of the Elise Chapin Wildlife Sanctuary has reached his eightieth birthday. Mr. Walker has the enthusiasm of a boy for the sanctuary and its sponsor, the Chattanooga Audubon Society, and he says that "there is much more to be done—and *will* be done!"

By way of lending emphasis to these words, work was commenced during the past spring on a new pavilion, located not far from Spring Frog Cabin, which will seat as many as 200 people for holding meetings and breakfasts, and is to be fitted with a grill, modern rest rooms and comfortable furniture. Plans have been made, also, for the erection of a fireproof building to house the Society's natural history library, Indian relics and Nature specimens, hitherto displayed in the rather cramped quarters of Spring Frog Cabin. The fifteen thousand dollar cost of the pavilion was met from the funds of the Chattanooga Audubon Society.

Robert Sparks Walker, who has brought the Elise Chapin Wildlife Sanctuary from an enthusiastic idea to its present flourishing condition in a span of fourteen years has, in his long lifetime, been editor, writer, poet, naturalist, publisher and lecturer. He has recently completed a soon-to-be-published anthology of contemporary bird poems, illustrated by Walter Ferguson, one of America's finest bird artists. For twenty-one years he was editor of the magazine *The Southern Fruit Grower*, has been president of the Tennessee State Horticultural Society, and is a life member of the Tennessee Academy of Science and the Tennessee State Garden Clubs. He finds time, also, to edit the Audubon Society's quarterly magazine, *Flower and Feather*, with its timely conservation and Nature stories, poems and comment. Of the sanctuary to which he has given so many years and so much energy, Mr. Walker simply says, "I am so glad to see this dream of mine come true!"

CEANOTHUS

Night mantled the hills
With moonlight's luminous mauve
Which the dawn ensnared
On spidery boughs—sweet wild
Lilac, amethyst-petaled.

Ethel Jacobson

The silvery menhaden, king of the industrial fish-processing industry, travels Atlantic waters in tremendous schools, and furnishes great quantities of oil that is used in products like paint, printing inks, soap and insect sprays.

The Bountiful Menhaden

By BERNARD L. GORDON

Photographs by the Author

THE KING OF the industrial fish-processing world is the menhaden, or pogy, found in Atlantic waters from Nova Scotia to Brazil, a fish whose products are used in the manufacture of candles, soap, printing inks, paint, insect sprays and many other products.

Although this species is edible, it is not highly regarded as a food fish for humans because of its high oil content, but from early colonial times it has provided bait and chum for other fish, and has been used widely as a source of fertilizer, oil and animal food. During the middle part of the nineteenth century, considerable quantities of menhaden were cured and salted for export to the West Indies, and a small amount was consumed in the United States.

From 1873 to 1875, young menhaden were canned under the name of "shadine," "ocean trout," and "American sardine," but the developing Maine sardine industry soon put an end to canned menhaden. During the second World War, food shortages caused the menhaden to be canned in fairly large quantities, but most of the pack was put up for export, and little was consumed in this country. Today, only the roe is sometimes saved for freezing, salting or canning as food for human consumption.

The common menhaden, *Brevoortia tyrannus*, probably is known among fishermen by more local names than any other fish. Down East, north of Cape Cod, we find the names "pogy" or "hard-head" widely used. In southern New England, the names "bony-fish" and "menhaden" are in common usage. A little farther south, in New York and New Jersey, the fish are known as "mossbunker" or "bunkers." The name "mossbunker" is a relic of the Dutch colony of New Amsterdam, where the Hollanders originally called this fish "marshbanker," the common name of a species that visited northern Europe in large schools.

In Delaware and Chesapeake Bays and the Potomac River we find some fishermen calling this species "bay alewife" and "green-tail." In Virginia, menhaden are sometimes known as "bug-fish" and "bug-head" because of the parasitic crustacean, *Oleucira praegustator*, which is quite frequently present in the mouths of southern members of the species. From North Carolina to Florida, fishermen generally use the name "fatback" because of the smooth, fat back and oiliness of the flesh. Other names sometimes used along the coast include "yellow tail shad," "shiner," "old wife," "chebug," "white fish" and "pilcher."

Menhaden have been known since early colonial times, when the Indian chief Squanto, who was friendly with the white men, taught the Pilgrims to fertilize their crops by placing the fish in the soil with their hills of corn.

The first serious effort to separate the menhaden oil from the flesh came during the first half of the nineteenth century. According to Goode and Clark, in 1887, during the War of 1812 paint oils became so scarce and expensive that the people of southern New England conceived the idea of using fish oil for the purpose. Among the first to go into the business was the Gardiner family, living on Mount Hope Bay, Rhode Island.

"The first method was to drag the pogies ashore with seines and put them in large casks or hogsheads brought down to the water for the purpose," said Goode and

Clark. "After filling the casks with fish, salt water was added to cover them and boards—weighted with stones—were put on top of the fish to press them down. The fish were left to rot for a few days, after which they were thoroughly stirred with a long stick daily to break up the fish and liberate the oil so that it could come to the surface of the putrid mess. This process was kept up from two to three weeks, the oil being dipped off daily, after which the barrels were emptied into the water.

"About 1820 they commenced boiling the fish in large kettles, stirring them frequently and skimming the oil off by hand. Among the first to do this was John Tollman at Black Point, East River, Portsmouth, R. I.

"Soon the business reached such dimensions that the kettles were too small and they were obliged to build large cooking tanks, and with these steam was introduced for cooking, the pipes being laid at the bottom, but wholly unprotected. The fish were thoroughly cooked and stirred, and after standing for a time the oil was skimmed off. A plug was then pulled from the bottom of the tank, and the whole mass allowed to run off on the ground near by. Quantities of scrap or chum accumulated in this way and found a ready sale for manure to the farmers. The cooking by steam was introduced about 1830 by John Tollman at Black Point, John Herreshoff at Prudence Island, and others in Long Island Sound. The next great improvement was the introduction of the press for taking the oil and water from the chum between 1855 and 1860 by a Charles Tuthill of Greenport, N. Y."

In Poquonnock Bridge, Connecticut, Elisha Morgan was reported to have made oil from bony fish prior to the year 1850. He owned seines with which he captured the fish, and spread them on the ground fresh. When he could not sell all his fish to the local farmers, he boiled the remainder and extracted their oil.

Probably one of the first people to utilize menhaden oil in Maine was a Mrs. John Bartlett, of Blue Hill. About the year 1850, while boiling some fish for her chickens, Mrs. Bartlett noticed a thin scum of oil on the surface of the water. She bottled some of this oil, and on her next trip to Boston showed samples of it to a Mr. E. P. Phillips, one of the leading oil merchants of that city. Phillips said the oil was marketable at $11.00 a barrel, and encouraged her to produce more. The following year the Bartlett family sent thirteen barrels of menhaden oil to Boston, and the next year produced one hundred barrels.

Today, the manufacture of menhaden oil, scrap and meal is an important part of our marine fisheries industry. There are some thirty-six plants located along our Atlantic and Gulf coasts, from Massachusetts to Texas, that process menhaden for fish meal and industrial products. The center of this widespread industry seems to be in Virginia and Louisiana, because of the greater poundage of menhaden landed in those areas. The total catch of menhaden in the United States is worth some ten million dollars a year to fishermen, and practically the entire catch is used in the manufacture of oil and meal, with only small quantities being reserved for bait. The value of manufactured menhaden products has been as high as eighteen million dollars.

The silvery, greenish-blue menhaden may be identified easily by its large, scaleless head, deeply forked tail, and toothless mouth. The fish usually average from ten to fourteen inches in length, while the largest on record appears to be one taken in 1876 off Woods Hole, Massachusetts, which was eighteen inches long.

Menhaden usually travel in tremendous schools, coming up near the surface of the water and causing ripples on clear, calm days. As they swim, their wide mouths are kept constantly open, gulping in sea water and the nutritive plankton it contains. Occasionally they will break water in a smooth sea, slapping the surface of the water with their tails.

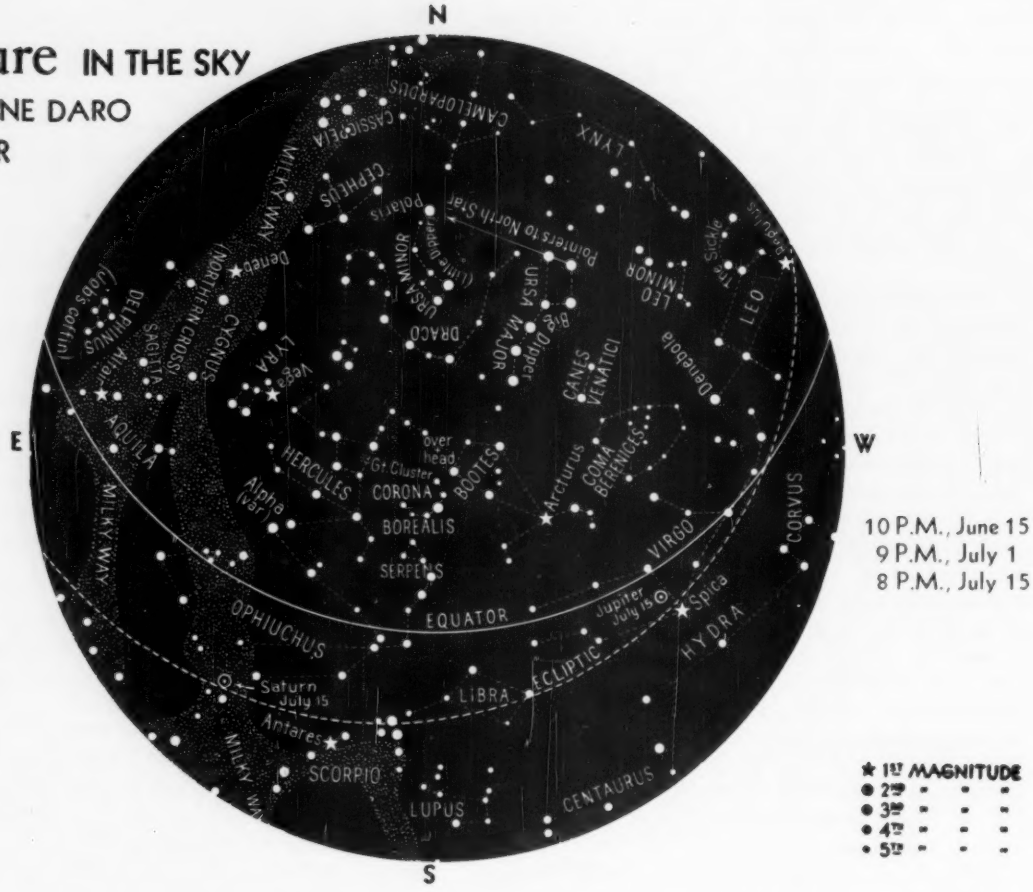
Great quantities of water are filtered in this way by the menhaden, according to Peck. Basing his calculations on the area of the fish's mouth opening, and its rate of speed, he estimated that a feeding menhaden forced water through its gills at the rate of 6.8 gallons per minute. Menhaden do not feed continuously, but, according to Peck's estimates, a menhaden would filter about a barrel of sea water an hour, extracting nearly a pint of food organisms from it. Menhaden feed on many kinds of microscopic sea life, like diatoms, crustaceans, rotifers, and many forms of larvae.

The menhaden is easily identified by its large, scaleless head, deeply forked tail and toothless mouth, and averages 10 to 14 inches long..

Because the menhaden is a migratory species, the catch is controlled by its seasonal appearance. Pogies generally make their appearance from Virginia to Maine when the water has warmed to a temperature of around fifty degrees, according to Ellison. The first menhaden arrive as a few scattered individuals, while the main schools appear when the water has warmed up to nearly sixty degrees. They appear in the Chesapeake Bay region in March and April; in New Jersey, New York and southern New England in April and May; Cape Ann, Massachusetts in mid-May; and if they appear on the Maine coast, it is usually in the latter part of May and June. The schools are eagerly (*Continued on page* 332)

Nature IN THE SKY

By SIMONE DARO GOSSNER



To use this map hold it before you in a vertical position and turn it until the direction of the compass that you wish to face is at the bottom. Then, below the center of the map, which is the point overhead, will be seen the constellations visible in that part of the heavens. Times given are for Local Standard Time.

Stellar Magnitudes

In describing the planets for the current month, I often use the term *magnitude* and a number preceded by a plus or minus sign. This is an accurate and convenient way of describing the brightness of a celestial object. It should be emphasized, to prevent any misunderstanding, that the term magnitude as used in astronomy refers exclusively to the brightness of the object. It has nothing whatever to do with its size.

The first to introduce the notion of magnitude were two astronomers of antiquity, Hipparchus and Ptolemy. They had no telescopes, and their system was simple. They divided the stars visible to the unaided eye into six categories of brightness. The first group contained about twenty of the brightest stars, while the sixth group contained the faintest ones barely at the limit of visibility. Thus, in their system, a second magnitude star would be slightly less bright than the stars in the first group; a third magnitude star would be roughly average, and so on down the scale.

The discovery of the telescope made it possible to observe a large number of stars beyond the limit of naked eye visibility. The magnitude scale was extended to these fainter stars, but, until the beginning of the nineteenth century, there was no unity in the practice, each astronomer using his own judgment. Sir William Herschel, in particular, is known for his use of very high magnitude numbers.

The first major step toward a unified system was accomplished when Sir John Herschel, around 1830, observed that a first magnitude star was roughly a hundred

times as bright as a sixth magnitude star. He also noted that, within the range of naked eye stars, the earlier observers had nearly kept a constant ratio of relative brightness from one magnitude to the next. Thus a fourth magnitude star was about 2.5 times as bright as a fifth magnitude star, a third magnitude star was roughly 2.5 times as bright as a fourth magnitude star, and so on.

This is not purely a coincidence, but stems from a physiological fact originally formulated by Fechner. Our senses respond to a change in stimulus in a manner that is not proportional to the *amount* of change, but rather to the *rate* of change. Let us compare, for example, the brightness of three light bulbs. If the second is three times as bright as the first, the third must be three times as bright as the second (thus nine times—*not* six times—as bright as the first) in order to give the impression of an equal change between bulbs one and two, and two and three.

In 1850, Pogson proposed the adoption of a uniform magnitude scale in all astronomical work. In order to remain as close as possible to the scale used for centuries for the naked eye stars, he proposed to adopt the exact fifth root of one hundred (2.5119) as the uniform intensity ratio corresponding to a step of one magnitude. In this fashion, a first magnitude star is exactly one hundred times as bright as a sixth magnitude star.

It was agreed to set the origin of Pogson's scale to make it coincide at the sixth magnitude with the scale of the *Bonner Durchmusterung*, one of the most widely used star catalogs. This new scale has been in general use ever since.

Some stars are actually brighter than the first magnitude, so that it became necessary to extend the scale at its brighter end, using a minus sign where necessary. On that basis, for example, the magnitude of Capella is 0.1, that of Sirius is −1.6.

We can learn much from a study of the apparent brightness of stars. Although individual stars vary in intrinsic brightness, the stars that appear fainter to us are *on the average* those that are farther away, exactly in the same way that street lights look dimmer when viewed from a distance.

Therefore, every time we put into service a larger telescope, enabling us to observe fainter stars, we are actually reaching farther into space. By evaluating the total number of stars within any range of magnitude, we may obtain a good estimate of the density of the stellar population at a given distance from the sun, in any direction of our choice. Such studies undertaken earlier in the present century have given us the first precise notions of the structure of the Milky Way, and the first hint that we are located in a spiral galaxy.

The careful determination of stellar magnitudes constitutes an important branch of astronomy known as "photometry" (from the Greek "measurement of light"). Measuring the magnitude of every known star would be, of course, an impossible task. A number of regions distributed evenly over the whole sky have been selected for magnitude studies. In each of these regions, the brightness of some twenty or thirty stars has been measured with the greatest care. These stars can then be used as a standard of comparison in any neighboring region where magnitudes may be required.

Until recently, the best way of determining magnitudes has been by photographic means. For the past decade, however, the use of the photoelectric cell has considerably increased the attainable accuracy. Unfortunately, photoelectric work is still limited to the brighter stars; for the fainter ones, we must still rely on photographic determinations.

STARLIGHT-WAVE

Plunging the bleak
And empty arc,
What must it seek
In the depths of dark?
We catch that light
From an endless shore
And hail from the night
A visitor.

Daniel Smythe

The moon will be full on June 1, July 1, and July 30. The New Moon will occur on June 17 and July 16.

Summer will begin on June 21, at 4:57 P.M., E.S.T.

The earth will be in aphelion on July 5. On that date, it will reach the point farthest away from the sun on its yearly course.

Mercury will rise about forty-five minutes before the sun on June 1, and will remain a morning star until June 13. It will enter the evening sky on that date. By the end of June, it will set one hour after sunset. It will reach its greatest eastern elongation on July 26, and will set between sixty and ninety minutes after sunset throughout the month of July. It will, however, remain low in the west during that period, because this will not be a very favorable elongation.

Venus (magnitude −3.3) will be a morning star rising about two hours before the sun in June and July. It will rise north of east, and will be above the eastern horizon by sunrise.

Mars will rise at 1 A.M. on June 1, 12 P.M. on July 1, and 11 P.M. on July 31. In the month of June, it will be found in Pisces above the southeastern horizon at dawn. By the end of July, it will be well up in the south by sunrise, and will have moved into Aries. It will brighten to 0 magnitude in July.

Jupiter, in Virgo, will be found a few degrees to the north of Spica in June, and will move gradually toward the northeast of Spica in July. It will set in the west at 2 A.M. on June 1, 1 A.M. on June 15, being due south at sunset. In July, it will be mostly southwest at sunset, setting at midnight on July 1, 10:30 P.M. on July 31. Its magnitude will fade slightly from −1.8 in June to −1.6 in July.

Saturn, in Ophiuchus, will be northeast of Antares. It will remain fairly low in the southern sky, rising in the southeast and setting in the southwest. In June, it will rise one hour after sunset on June 1, at sunset by June 15, and will be up nearly all night. On July 1, it will have risen by sunset and (*Continued on page* 332)

Nature IN THE SCHOOL

By E. LAURENCE PALMER

Professor Emeritus of Nature and Science Education, Cornell University, and Director of Nature Education, The American Nature Association

The Private Library

I HOPE THAT professional librarians will not read this; or, that if they do, they will not take my comments too seriously. I am not writing about those orthodox libraries indexed according to the dictates of the Library of Congress, and usually administered by dedicated persons—often not informed in my fields of interest—but usually glad to cooperate with reasonable people interested in what such institutions are prepared to give. Without public libraries and librarians, we would have a sorry civilization.

I am writing this about your home library and mine, the kind you see when you are a guest in a neighbor's home; but more particularly the kind I happen to have in my own home. To me, a private library is a major satisfaction. I enjoy it as thoroughly as some of my neighbors enjoy their gardens, their golf clubs, their card parties or their rumpus rooms.

Within the year, I considered seeking a new home in which to enjoy my third retirement in six years. We found a home that had the view we wanted, the location that satisfied us, and the construction that met our standards. We lost interest when the owner proudly displayed his four-shelf library hidden—appropriately, I think—behind some closet doors. It now seems that I will spend the rest of my days in complete happiness, in the home we built to meet our needs nearly thirty years ago. As the family has grown smaller, the library has grown larger, so we can make a satisfactory adjustment if we can ever forget the view from the house we almost took.

Showing the library

When I visit a strange home, I find it almost impossible to resist giving the library a detailed examination. I find it difficult also to resist taking my guests into my own library and to share with them the prized possessions there. I remember with much appreciation the time Charles Lincoln Edwards took me into his inner sanctum and showed me some of his rare editions. And I remember the time when I had a ten-shelf library and Sir Thomas Geddes visited my home. He had few inhibitions, and was built like a pocket edition of Santa Claus, with a long white beard but no "little round belly." He came into the room where my library was, and promptly flopped himself on the floor in front of my book cases. I am proud to say that the books he found were sufficiently interesting to hold his attention for quite a while, and to break such "ice" in our conversation as might otherwise have developed. I have visited many libraries where I wish I might have flopped on the floor and looked things over, but I am afraid convention forbids.

I owe the possession of my present working library of more than 100 four-foot shelves to the parsimoniousness of my early professional bosses. The first year I held professorial rank at Cornell I asked for $100 a year to keep up my department library. I got a hearty laugh and ten dollars a year, which I had to share later with another member of my growing group. With that experience as a stimulus, I became convinced that I would have to find support elsewhere. I began writing beyond the demands of my professional obligations to the university. For years, I plowed back into my personal library almost everything I earned beyond my regular salary; and, as some of you may know, I have been writing for *Nature Magazine* since 1925. During that time I have discarded many books, but have evolved categories in which I try to keep the best books available. I have fifteen cases, each with 8 four-foot shelves, and each stack dedicated to a library of some particular field.

Limiting references

For example, I have agreed with myself that I will keep my mammal references down to 8 four-foot shelves, and so on. The idea may sound crazy to a librarian, but it works out beautifully for me. And as the years have passed, new books have been added to each stack; but many a dog-eared book survives where a finely covered newer book has vanished. While I was a university teacher, these books were in my office and were used freely by students and faculty, in classes, on field trips and on loan. I lost few books. When retirement time came, it was obvious that any space I might have would be given begrudgingly. In fact, I was told that conditions were so crowded that I could have just a desk—but it was hoped I might leave the library. In this atmosphere, I remodelled my house, got new steel cases, and when retirement time came I took the books home. With that move, I was offered space in three different university departments, but the books and I are still at home and getting along surprisingly well together, thank you. The library is still growing, and I hope that I am keeping pace with its development and with the times.

This working library of which I am writing is, of course, independent of the books that were hand-me-downs from two families, independent of my wife's geology-paleontology library that exceeds mine, and independent of the mystery stories, novels, histories and Christmas gift books. All of these help now and then in emergencies.

Classifying the books

Possibly the most unusual thing about my working library is the way I have classified my books. Once, when we were away from home for a few months, an obliging housekeeper rearranged my library. She put all the red books together in the order of their size. It made an interesting picture, but I found it difficult to use, and somehow managed to get back to my own system without losing the services of a marvelous cook and baby-watcher!

The major categories in my working library, each represented by about eight shelves, are these: mammals, birds, cold-bloods, inverte-

brates, woody plants, herbaceous plants, botany texts and plant ecology, zoology texts and animal ecology, physical science, conservation, outdoor living, basic references to writing and knowledge, science teaching, general education, and selections from my files of technical journals and separates. This system would mean little to others, but it is just what I think I need. I can find anything I need almost immediately, even though the library includes from 2000 to 3000 volumes. In each of the categories, the books are arranged with shelves devoted to a particular aspect, or groups of shelves may be so planned. In each of these, the books are arranged alphabetically according to the authors, so whether a librarian would agree with what I have done or not there *is* a system.

I must admit to a few departures from a rational classification, but I just cannot help it. In the whole series, I have such shelves as those devoted to mathematics, to physics, to chemistry and to facets of earth science like astronomy, economic geology, geomorphology, and so on. In another section, I have shelves devoted to philosophy, to literary gems in the Nature field, to verse and poetry, and one devoted, strange to say, to nonsense. I get quite a lot of fun showing this shelf to my visitors—not because they are books of recognized nonsense value, but because there are some that others would put in a serious category.

Visitors amused

Possibly what amuses some of my visitors most in this nonsense shelf is the inclusion of most of the "bibles" of the science educators, such as the *Thirty-first Yearbook of the National Society for the Study of Education*, and *The Wonderworld of Science*, that for eighteen years have been misinforming our teachers and youngsters about the field of science. There are a number of other sacred calves of science education that without apology I put on my shelf of nonsense, largely because their presence there raises questions that can be answered most effectively by reference to the books themselves. I have frequently referred to these things on this page in the past, and need not repeat my views here. I always welcome the opportunity to justify my assignments to this particular shelf.

Really, folks, I believe that a rich private library is about the most useful accessory one can have when he faces a future in which he cannot climb gorges, wade streams, and ski through the open country as he once could. I am not yet limited in my activities to that private library of mine, because this year my field trips will range from winter to summer and from our mid-West to the mid-East. When the time comes that my legs give out, or I have to stand by because my friends cannot join me on my trips, then I will not be forced to get my intellectual satisfaction from the radio and television. I have that private library around a day bed, and with *that* I can face anything with a grin on my face. I hope you can join me!

Post-Summer Workshop

The 1958 Institute of Nature Study and Conservation, post-summer session workshop offered by the University Extension of the University of California, will be in session this summer from August 4 to 16 at Santa Barbara. In addition to the daily sessions, there will be field classes in seashore life, native birds, astronomy, native plants, rocks and minerals, elementary science methods, conservation, and organisms and their environment. A folder with more detailed information may be obtained from the University of California Extension at 405 Hilgard Avenue, Los Angeles 24, Cal., in which credits, scholarships, and available accommodations are outlined.

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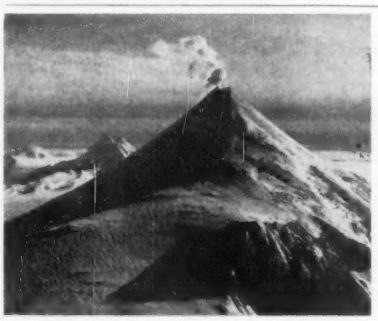

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THE Nature CAMERA

By EDNA HOFFMAN EVANS

Vacation Time Photography

THIS JUNE-JULY CAMERA SECTION is one of the most important ones that I write during the year—or so it seems to me. It is important because with it we welcome the summer vacation season. During that time we should take more pictures, and better pictures, than we take at other times during the year.

In the first place, if we go away for a vacation, there are new and unfamiliar scenes to be photographed. If we stay at home and have a lazy, loafing vacation, we will have more time to take the pictures we have not gotten around to taking lately. Because it is vacation season, we should have more leisure to spend on our pictures—time to plan and arrange, to select better points of view, and to try for better compositions.

There are many little details that the summer vacation photographer should bear in mind. Some of them are important enough to be able to literally make or mar a summer's photography.

To begin with, there is equipment to be considered, if you are planning a vacation trip. Take along everything you think you will need, but try to pack it as compactly as possible. In the car, keep your equipment together and pack it in the same place each day. In that way, if you see a good shot along the way, you will not have to waste precious minutes accumulating your gear and getting it ready for action.

I think it is best to keep your camera loaded; fortunately, a loaded camera is not as dangerous as a gun, loaded or unloaded. There is some chance that the film may be damaged by excessive heat but, by observing the pointers given shortly as to camera care, you easily can avoid that. Anyway, if your camera is loaded, you can shoot without delay should an opportunity present itself.

New cameras are nice, but do not take an untried new camera on a trip. Test it beforehand. Shoot several rolls and observe the results. That way, you will not be disappointed in case there are a few "bugs" in the new camera, or a few quirks that you must master before getting good results.

Care of equipment

Then there is the care of camera and film to be remembered. Never—no, never—leave camera and/or film in a closed-up car during long, hot summer days. Direct sunlight beating in on a camera left on the shelf of a back window, or the heat in a closed glove compartment, can damage lenses and can cause the film emulsion to crack and buckle.

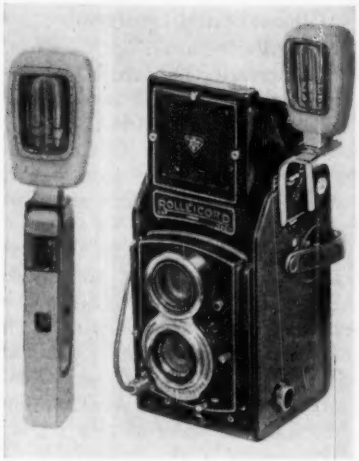
At the shore, sand can be harmful to delicate camera mechanism; so can water, either fresh or salt. Make sure your equipment is clean and dry at all times. Watches may be waterproof and fountain pens may write under water, but most cameras (unless they are especially adapted for submarine photography) do not take kindly to a dip in the deep.

Another pointer. Take enough film (and flash bulbs) along so that you need not hoard or "nurse" your shots. This is particularly true if your vacation takes you off the beaten path and away from large cities with well-stocked photo supply shops. Sometimes you can pick up film in out-of-the-way places, but do not count on it. This is particularly true if you want some special size or kind of film.

Take enough pictures. By that I mean do not find yourself wishing two weeks later and a thousand miles away: "Oh, I wish I had taken a picture of that!" If you see a picture, record it. Do not put off until tomorrow pictures that can be taken today. Tomorrow your plans may change, you may go by a different route, or the weather may not be cooperative. Expect some failures, and make duplicate shots when you are not sure of yourself. Vary your technique, change lens and shutter speed. In that way your pictures will not be exact duplicates and—who knows—one combination may produce vastly more interesting results than another.

Back now to the subject of film. Some fans use one kind exclusively, and perhaps that is best, for techniques can be standardized and results can be anticipated. However, if you are not one who is "wedded" to a single film, use your summer leisure to experiment. With black-and-white, try several different types and speeds to see which give the most gratifying results. With color,

If you are not driving too fast, you can see interesting scenes like this, and can stop to record them before you are a mile or so beyond.



The Rectablitz is the world's smallest electronic speedlight.

remember that the new high-speed Anscochrome will allow you to take available light pictures that formerly were obtainable only with flash. But be willing also to try several rolls—use the first one to "learn" on.

Changing lenses

Switch lenses, if you have more than one. See what different results you can obtain with your regular lens, your telephoto, and your wide angle lens, all from the same viewpoint. Try filters the same way. In fact, do all those things—photography wise—that you have read or thought about, but never had the time to try.

If you are traveling, allow yourself time for picture taking. It has been my experience that photography and travel-under-pressure never mix. If you must cover five or six hundred miles a day, anything but on-the-fly photography is out. There is nothing more fun for a photographer (and probably nothing more exasperating to a non-photographer) than spending half a day just getting set for the right picture. You may have to wait for light, or for the desired shadows; you may want a special cloud effect, or you may have to hold off until the breeze dies down. These are all leisurely luxuries that most of us can afford, time-wise, only during vacations.

Around the house and the yard, watch for special subjects. Scarcely a summer passes but what some baby bird will drop in while taking its flight lessons. Treat it gently, and return it to its mother after it has posed for you. For that matter, do not wait for flight lesson time. Watch for nests and record the happenings in them as they occur. If you have been hospitable to your bird neighbors during the rest of the year, you are sure to have a number of regular visitors, and some that will make themselves at home.

Do not neglect the toads in the garden, or the tree frogs (if you live in the same areas as they do). Both make interesting subjects for pictures, either outdoors or brought inside to pose under more controlled conditions.

Catching the insects

There are insects, too; grasshoppers, beetles, butterflies, and moths. These latter are hard to catch on the wing. However, with a wire focusing aid that allows you to know just when the subject is within range, you may capture them. Watch for spider webs, especially in the early morning when they are spangled with dew. Watch for the web-spinners, also, for they make obliging models.

Do not overlook the mushrooms and toadstools that appear overnight in the lawn; and in the woods, watch for interesting formations of fungus on rotten logs. They make fascinating pictures, either as pictorials or as patterns. Look up from the meadow and notice the cloud formations. Even the threatening summer thunderheads make good camera subjects.

If you are vacationing in a new environment, be sure to take special pains to remember that photographic conditions may be different from the ones with which you are familiar. If you are from inland and are vacationing at the beach, remember that sand, like snow, is light in color and lacks dark shadow areas. There is a tendency in such cases to misjudge light and to overexpose. Overexposure is especially undesirable with color film.

When you have the combination of bright sunlight and light sand, you should use one full stop less than you would for average objects in sunlight. This applies particularly to scenes that do not contain people. Good shoreline pictures should result when Ektachrome is shot at 1/100 second at f/11; Kodachrome at 1/50 with lens opening between f/8 and f/11; and Kodachrome movies at f/11. When photographing close-ups of people at the beach, use the setting for average subjects, one full stop more exposure than for beach landscapes.

If you are shooting bird pictures—

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a flock of gulls, for example, or some of the long legged waders—remember that your shutter speed must be faster in order to "stop" them, so open up your lens accordingly, but consider also the superabundance of light reflected from the sand and from the water.

Sand area exposures

The recommendations do not apply to brown sand beaches, of course, for these require "average" exposure. Sandy desert areas, such as are found in the Southwest, seem to fall between "white sand" and "average" exposure requirements, but on the basis of my own experience, I treat them as closer to the white than to the average.

One final pointer. Light sand is such a good reflector that side and back-lighted subjects are bathed in light even on their shadowy side. This means that you do not have to vary exposure depending on whether the sun is falling in front of or behind your subject.

When you are driving through new country—especially when it is "pretty" country—try to go slowly enough so that you can see pictures. You will enjoy your trip much more, will be less tired at the end of the day, and will be able to stop for photographic purposes before you are a mile or so beyond the scene that attracted your eye.

The farm picture that illustrates this section was taken en route, in Utah. I usually watch for log cabins, because they are getting rather scarce. So when I saw this one I pulled to the side of the road, unlimbered the camera, took my picture, and went on. In cases where there might be objections, or where getting a picture means trespassing on someone else's property, it is always good manners to ask permission before you shoot. Rarely will permission be denied, and much oftener you will make an interesting and interested acquaintance.

Keep a notebook record of your shots. In that way you can remember where they were taken (it is easy to forget some details on a long trip). By recording technical data about exposure, light conditions, and the like, you can check your results and be better able to understand just why such and such a shot did not turn out as you expected.

These are only a few of the many things to do, to remember, and to take advantage of, during the summer vacation season. But whether you journey afar, or stay close to home, summer is the time for photographic fun. May you have lots of it this season!

COMMERCIALLY SPEAKING

The world's smallest electronic speedlight, the Rectablitz, is now being supplied with a special direct-contact shoe for use with Minox cameras without synchronization cord. A special accessory clamp attaches the standard reflector to the case of any twin-lens reflex camera. The miniature reflector weighs only an ounce and a half and is smaller than a pack of cigarettes, yet it provides uniform light distribution with guide numbers of 35 and 20 for Ektachrome and Kodachrome respectively. It works on either three standard 1.5-volt dry cell batteries contained in a compact power pack, or with an accessory cord on 110-volt A.C. Recycling time with batteries is eight to ten seconds; with A.C. it is two seconds. The outfit is distributed exclusively in this country by Karl Heitz, Inc., 480 Lexington Ave., New York 17, N.Y. It retails for $69.90, with either Minox or standard shoe. The accessory clamp for twin-lens cameras lists at $4.95, and an extra reflector for $24.95.

Kodacolor film, formerly available only in roll film sizes, will be made this summer for 35mm. cameras, according to an announcement from Eastman. It will come in 20-exposure rolls, and will have an exposure index of 32 for daylight. A typical setting for outdoor subjects on sunny days will be f/11 at 1/50, or an exposure value (EVS) of 13. The roll will retail at $1.85, and the color prints that will be made from it (no transparencies) will be 32 cents apiece for the 3X, and 23 cents for the 2X size.

New Federation Building

The National Wildlife Federation, natural resource conservation organization, has started preparation of a permanent headquarters building in the 1400 block of 16th Street, N.W., in Washington, D.C. Construction of the new building will commence during the summer on land purchased with a $300,000 grant made available by the executors of the estate of the late Louis Ayer Hatheway, of Massachusetts. The Federation's present quarters are at 232 Carroll Street N.W., Washington 12, D.C.

Conservation Conference

At the Fifth Annual Conference of the Conservation Education Association that is to be held at the University of Utah in Salt Lake City this summer from August 18 to 21, a varied program built around the theme "Conservation Education at the Grass Roots—How We Can Do It Better" will examine conservation teaching techniques and tools and their possible improvement. The teachers, youth group leaders and conservation workers in attendance will hear a panel discuss "grass roots" problems in conservation education, and there will be a tour of inspection of the famous Davis County Watershed on the Wasatch Range. Conference participants will include educators from all teaching and administrative levels, leaders of youth groups, and representatives of industries and private and public agencies concerned with the conservation of natural resources.

Possible Park

(*Continued from page 317*)

the erosion of human use, although the economic return, even locally, is negligible. On the other hand, if it were given complete protection within the proposed park the entire nation would benefit far beyond a matter of dollars and cents.

The Great Basin Range National Park Association was formed in 1957 to spearhead the campaign. Its headquarters are in Ely, Nevada, and membership is open to anyone interested in furthering the project. Available from the association for showing throughout the United States is *Great Basin Range—Nevada*, a half-hour color and sound movie of the scenery, geology and ecology of the Wheeler Peak area.

There is today a pressing need for more open spaces for the inspiration, recreation and education of the American people. Our once magnificent natural heritage is disappearing rapidly, and soon the opportunity to preserve the last few remaining examples will be gone. Here, around Nevada's majestic Wheeler Peak, is a matchless area of two hundred and fifty square miles or more that qualifies in every way to be our thirtieth national park. Let us not throw away this chance to give to present-day and future Americans one more superlative example of the land in its unspoiled condition.

Evison Retires

After twenty-five years with the National Park Service, Herbert Evison, whose career in park work started more than 38 years ago, retired on April 30 this past spring. Mr. Evison, who for the past twelve years has been Chief of Information, was succeeded by James J. Cullinane, assistant chief for the past two and a half years. Mr. Evison's career in Park work began when he became executive secretary of a Washington State organization engaged in promoting parks, and in 1929 was chosen by Stephen Mather, first director of the Park Service, as executive secretary of the National Conference on State Parks. He became the Service's first Chief of Information in July, 1946. Mr. Cullinane was a newspaper reporter for more than twenty years before joining the National Park Service staff.

Personalities

J. Greg Smith, until recently editor of the Wyoming Game and Fish Commission's *Wyoming Wildlife* magazine, is now editor of *Outdoor America*, magazine of the Izaak Walton League of America. Mr. Smith graduated from the University of Wyoming in June, 1950, and worked in advertising and television directing before he joined the Wyoming magazine in 1954.

Dr. Harold E. Anthony, chairman of New York City's American Museum of Natural History's Department of Mammals, and a former deputy director, has retired after forty-seven years as a member of the Museum staff. An eminent mammalogist, Dr. Anthony had been in charge of a mammal collection that numbered more than 170,000 specimens, and was instrumental in the creation of the Museum's famous Hall of North American Mammals, as well as acting as scientific advisor of the exhibitions in the Hall of African Mammals, the Hall of South Asiatic Mammals, and the Hall of Ocean Life.

Park News

Director of the National Park Service Conrad L. Wirth has recently announced several personnel transfers in the park service. Kittridge A. Wing, since 1956 the superintendent of Fort Union National Monument in New Mexico, has been promoted to the newly established post of assistant superintendent of San Juan National Historic Site in Puerto Rico. Fred G. Bussey, former administrative officer at Glacier National Park, has been appointed superintendent of Colorado and Black Canyon of the Gunnison National Monuments in Colorado, and Eugene D. McKeown, assistant chief ranger of the Blue Ridge Parkway, becomes the superintendent of Guilford Courthouse National Military Park in North Carolina.

Hit the Right Nail

A new magnetic nail holder made with a long-lasting magnet will give the household do-it-himself expert welcome relief from smashed fingers, according to the Magnetic Holder Company, Box 715, San Antonio, Texas, its manufacturer. The new tool helps big fingers with short tacks, nails, brads and the like, costs $1.00, and may be purchased direct from the manufacturer.

I have a wife and thirty-eight kids! Give them a break — watch your fires in the woods!

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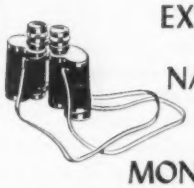

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Living World

(*Continued from page 292*)

Spectators do not realize it, but what they believe to be a view of the sky, as seen through an entrance to the cave, is actually a painting. The use of this painting, and two mirrors which reflect it, give a feeling of greater depth to the cave. This false entrance appears to the visitors to be genuine, and about forty feet away, although it is actually only ten feet from them.

The bats themselves were collected in Mexico. In the tunnel cave a fairly constant temperature must be maintained to keep them healthy and happy. They have a hidden entrance to the cave and a flight cage above the tunnel. Here they exercise each night, and, since they are fruit-eating bats, are fed cantaloupe or papaya.

Each of the animal dens is also connected to an outdoor exercise enclosure above the tunnel. The animals have access to these cages at all times, and are fed there. However, since most of them are nocturnal, they are almost always on view, in their dens, for their diurnal visitors.

Above the tunnel, the desert growth has been replaced and soon will completely hide from view the animals' outdoor enclosures and the service area. In the near future, visitors will not be aware of the tunnel, except by reputation, until they approach the door, flanked by cactus plants and petroglyphs, or Indian picture rocks.

In the first four months following its opening, approximately 90,000 people visited the tunnel, and the Museum found it necessary to prepare an additional parking lot to accommodate the cars of visitors, who are now coming to the Museum in larger numbers and staying longer.

These gratified visitors are proof that the tunnel is an unqualified success. Dr. Charles R. Schroeder, director of the world-famous San Diego, California, Zoo, expressed this prevailing feeling about the tunnel with the following statement to the Museum staff.

"It's a tremendous idea and a marvelous accomplishment. It represents an entirely new and exciting concept in wildlife exhibits. You have taken another lead in natural history education, a lead that will eventually be followed throughout the country."

1958 Caravan

The 1958 Conservation Caravan, the annual field excursion of observation, conservation instruction, and just plain outdoor adventure is co-sponsored this year by the Conservation Forum, of Holland, New York, the Buffalo Museum of Science, and the Western New York Outdoor Education Association. It is being arranged for the days of August 23 to 30, and the tour will take in a number of State parks, sanctuaries and refuges in New York State and Connecticut. The Conservation Caravan is conducted on a non-profit basis. Good meals and lodging are arranged in advance, and transportation is by bus; interested persons may inquire as to fee and itinerary from Conservation Caravan, Holland, New York.

Magnitudes

(*Continued from page 325*)

will set about an hour before sunrise. For the remainder of July, it will be up at dark and will be due south in late evening, setting at about 2:15 A.M. on July 15, 1:15 A.M. on July 31.

A few bright Perseid meteors already may be seen after midnight toward the end of July.

Menhaden

(*Continued from page 323*)

awaited by pogy boats in bays, sounds and even in the mouths of the larger rivers. The fish generally stay in New England waters until fall, when they migrate to warmer southern waters. A few menhaden remain off the coast of Florida throughout the year.

Menhaden mature during their third or fourth years, and generally spawn in the summer or fall. They increase in oil content with age and size, and northern menhaden tend to have a higher oil content than their southern counterparts. They are preyed upon by virtually every carnivorous species of fish that inhabits the same waters.

The chief method used in the capture of menhaden is by purse seining, and the fish are usually removed at the processing plant by suction pipe, or bailed out and placed on a conveyer belt. It is necessary to process the menhaden as soon as possible after they are taken from the water, as stale fish putrify rapidly, and become difficult to handle.

While there seems to be a seasonal variation in the yield of oil per fish, the menhaden is always larger and fatter in the fall than in any other season. According to Tressler, northern factories sometimes get as much as 20 gallons of oil from each 1000 fish, while fish caught in Florida waters rarely yield more than eight gallons of oil per 1000 fish.

Much menhaden oil is hydrogenated and utilized in the manufacture of soaps. When it is properly hydrogenated, a solid, odorless and almost colorless fat is produced, and such processed oil is used extensively in the production of laundry soap and the lower grades of toilet soap. Some of the oil also is used in the preparation of lard substitutes, and in the manufacture of candles, lubricating oil and leather dressing. Menhaden oil is sometimes used in the preparation of heat-resistant paints, and as an ingredient in the manufacture of certain types of linoleum.

There are many questions yet to be answered by fishery biologists about the habits of the menhaden, questions like the causes of the fluctuation in their abundance, the exact locations of their spawning grounds, how to control a parasite that sometimes sterilizes the male menhaden, and the relationship of the menhaden's diet to its oil content. In view of the economic importance of the menhaden, it is not surprising that several marine research organizations are conducting studies of this fish in an effort to answer some of the questions.

New Association

The meeting of a special committee at the State University College of Forestry, at Syracuse, New York on March first signalled the official organization of the New York State Outdoor Education Association. The functions of the new organization include the provision of assistance in the development of local outdoor education programs, the promotion of better understanding and use of the out-of-doors and its resources, the improvement of teacher education opportunities in this field, and the exchange of ideas and techniques through publication of a newsletter and the holding of workshops and conferences. Dr. Theodore E. Eckert, Professor of Science at State University College for Teachers, at Buffalo, was elected president of the new association, which will hold its first annual conference early in the fall.

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CONCLUSION

WHEN President Rush Rhees of the University of Rochester went shopping for new blood with which to transfuse the management of the old Establishment, he selected Dr. Dean L. Gamble, and this proved to be a wise choice, destined to modify profoundly the policies and future of Ward's. Dr. Gamble and the writer were closely associated during their graduate training, and both received their baccalaureate and doctoral degrees from Cornell University. Gamble remained for three more years, until 1924, as assistant professor of zoology at Cornell, then left to become head of the zoology department of the General Biological Supply House (Turtox) in Chicago, at that time a vigorous and healthy newcomer and the major threat to Ward's supremacy in the supply house field.

In the summer of 1930, he studied methods of preparing marine specimens in the Supply Department of the Marine Biological Laboratory, at Woods Hole, Massachusetts, and that fall was elected vice-president of General Biological. So it was that in June, 1931, Ward's acquired for its new president a young man of energy, training, and experience. His first task was to supervise a move to a new plant, as the organization struggled out of the disastrous effects of its third and greatest fire. A large four-story building at 302 Goodman Street, just a block distant from their temporary quarters on the University Women's Campus, was rented from the Hollister Lumber Company. With 40,000 square feet of floor space and automatic fire sprinklers throughout, this structure was ideal. It was said to have been originally the old Sen-Sen factory, and the pungent odor of that breath-sweetener still lingered in a few unattended corners.

The new president had as his cabinet of department heads Mr. Hawley Ward in paleontology (including conchology) and taxidermy, Mr. English and Robert Vance in geology and mineralogy, Dr. Alexander B. Klots in entomology, Mr. Oscar Kirchhoff and Mr. William Kruse in biology and osteology, Mr. Harold Blackstone and Mrs. Pauline Wallace in maps and models, and the writer in microscope slides and as editor of publications and director of educational service. This is the group that became so well known to Ward's customers in the 1930's. New catalogs were produced, some of them the finest and most ambitious yet to appear; new preparations were devised and offerings modernized, designed to fit the changing trends in supply house merchandizing; the *Bulletin* resumed publication.

A new product

As an instance of a new product, yet one that would have pleased Professor Ward as furthering his ideals, the writer proposed the assembling of animal specimens of suitable size to fit uniform jars and serve to introduce the student to a taxonomic series. Soon Ward's was filling orders for their new Animal Kingdom Survey Set, and for similar series of vertebrates, of arthropods, and of still other groups. Success of the idea was amply demonstrated by the fact that other supply houses promptly copied these sets. They still sell well today.

Although heavily in debt to the University and with a depleted and damaged stock, the picture seemed bright for the future. But Fate was not yet through dealing out hard knocks to Ward's. Along came the depression, and then the second world war. Sales dropped fifty percent in one year. The Establishment would certainly have closed its doors if the University had not generously come to the rescue once more with another loan. Soon an agreement was reached whereby the firm was sold by the University to Dr. Gamble and Mr. Ward, with President Gamble having a controlling interest in the stock so that he could have a free

Dr. Dean L. Gamble, President of Ward's.

rein in developing the business. In time all of the indebtedness was paid off, and Ward's was once again under private ownership.

In 1942 still another adverse event occurred when, the lease having expired, the owners demanded return of the Goodman Street building, since they could rent it to the Stromberg-Carlson Company to greater advantage. So another move became necessary, and a run-down property at 3000 Ridge Road East, on Irondequoit Bay, was bought. The six-months task of moving and renovating and rebuilding was a costly venture that could ill be afforded at the time, but somehow it was all accomplished, and eventually proved to be a blessing in disguise.

Now ensued an era of prosperity, with rapid increases in sales in the major departments. Then once more the fire demon struck. The fourth Ward's fire came in February, 1951. The main building was not affected, but a large remodeled barn was destroyed and with it a great amount of the old Ward's bric-a-brac; skeletons of lions, tigers, camels, walrus, and many others, left over from former days. The department of models and equipment were housed here, too, and a large stock, some of it irreplaceable, went up in smoke. There was only partial insurance coverage. A big order all packed and ready to go to Greece, valued at nine thousand dollars, was not covered and was a total loss.

After this last calamity a large addition was built on the main structure, housing the offices, library, mailing, woodworking, and departments of equipment and microscope slides. Another wing to match on the other side is projected.

Mr. Ward retired in the early 50's, and Dr. Gamble will follow suit during the present decade, control passing then to his son, William Gamble, who has grown up with the business. The last twenty years have seen a remarkable change in the entire character of the venerable institution, now approaching its centennial year, 1962. The old Establishment catered to museums, both city and college. Its largest departments were taxidermy and paleontology. Today both of these are gone, paleontology having merged with minerals. Gone also is entomology, in the sense of stocks of specimens.

Changing demand

When museums began to hire their own preparators and specialists they relied less and less on Ward's, the godfather of them all. Colleges and museums no longer requisitioned rare and spectacular specimens from the four corners of the world; it matters little to a modern university department of zoology whether they have or do not have a mounted echidna, a moa egg, a genuine specimen of ichthyosaur, or a gorilla skull. These priceless appurtenances, once so vital, have no place in the modern program of *Drosophila* genetics or experimental embryology. The emphasis has shifted, and so the old Ward's passed with the changing fashion in education, and vastly bettered itself financially in so doing. There is very much more profit to be made in filling an order for fifty doubly-injected dogfish for class dissection than in supplying a skeleton of a wild boar here and a mounted elk there.

Top department in volume of business now is equipment, accounting for some fifty percent of all receipts. Beginning with insect collecting, mounting, and storing equipment, for which the Establishment has long been supreme, a great array of items used in all fields of biology and geology has been added, making this branch of the business an unusually complete one. The geological division, headed by David Jensen, is next in size, with a remarkably steady income. This branch, including minerals (Jensen) and paleontology (Fred Amos), has changed the least with the passing of time, the chief difference being that a greater quantity of study material and fewer exhibition specimens are now in demand. Biological preserved materials, under Robert Casey, ranks third—always a breadwinner in the supply business—and has shown astounding gains; 25,000 dogfish are required each year to fill the demand, 12,000 bullfrogs, and other items in proportion. Each June, Ward's men go to Louisiana to garner the popular batrachians and lubber grasshoppers. From Wisconsin come grass frogs, mudpuppies, and crayfish; peripatus arrives from far New Zealand, amphioxus from the shadow of Vesuvius in Naples. These are just a few of the hundreds of items that must be stocked in bulk, not for display as formerly, but for laboratory study and dissection. The medical profession depends on their premeds; the premeds upon Ward's and its sister institutions for the injected shark and the embalmed cat.

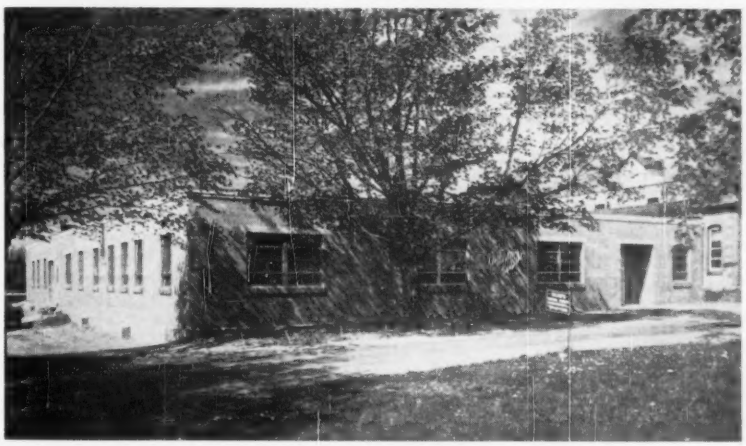
Fourth in volume of business is the department of microscope slides, whose chief is Mrs. Marita Heymann. Adequate space, personnel, and equipment now permit this branch to render excellent service. Next comes biological preparations, supervised by Andrew Konnerth. This department prepares skeletons, jar mounts, bioplastics and many other demonstration and exhibition specimens. Ward's has always been famous for its skeletal preparations. Today it can no longer furnish the great variety available in Henry Ward's time, but the volume of sales is greater. Contrast receipts in this branch, in 1933, of $1500 with the $75,000 and up of the present! Bulk of the business here today is in skeletons of man, cat, dog, pigeon, turtle, snake, and fish, but a considerable number of horses, cows, sheep, and pigs are also in demand.

Model department

The model department is one of the smaller these days, but fills an essential need and maintains its services. Two new sub-departments have shown a lusty growth, and would be indeed a source of wonder to the founder of Ward's could he return to the Establishment of today. These are bioplastics and visual education. Ward's was a pioneer, as usual, in bioplastics, the art of mounting small specimens in a solid block of transparent material that protects it forever from desiccation, breakage, or other damage. Not only does the company sell a great variety of teaching aids, such as embedded specimens of liver fluke, tunicate, dogfish vertebrae, or pig embryo series, and such popular novelties as butterflies and sea horses, but also kits of the materials, with full directions for the individual, whether teacher or science amateur, to make his own plastic mounts. This educational service also has been copied far and wide. We have recently received from Ward's one of their larger and more ambitious preparations of this nature, a sheep heart with arteries injected with red latex and veins with blue—one of the most striking and beautiful demonstrations of coronary architecture and circulation possible to conceive.

Visual Education

Visual education materials include film strips, motion picture films, color slides, projection equipment, and other teaching aids. The importance accorded every sort of item in this division by teachers throughout the country increases each year. The old Establishment, a Rochester institution, has now blossomed forth with three other headquarters; a dogfish processing laboratory at Casco Bay, Maine; a bullfrog collecting



A portion of the new home of Ward's Natural Science Establishment.

and preparing station at Schriever, Lousiana; and a western branch on Cannery Row (shades of Steinbeck!), Monterey Bay, California (P.O. Box 1749, Monterey, Cal.). The new manager of this western branch is Dr. Victor Sprague, for a number of years head of the microscope slide department in Rochester. All of this success and expansion is attributable to the guiding genius of Dean L. Gamble.

President Gamble, after years of toil and worry, through fires, war, and depression, with many a time in which he had to pitch in and inject frogs and cats himself to keep the old ship afloat, now can view his life work with satisfaction. Ward's has changed radically to suit changing times, an accomplishment that would have been impossible under the older type of management. It has survived many crushing vicissitudes, and now owns a large and modern central plant and three branches, free from encumbrance, and enjoys an income exceeding half a million dollars per year. Today, it has a number of able competitors, but the volume of business is sufficient for all, and Ward's will enter its second century still one of the world's best and most famous supply houses, as ever dedicated to that aim expressed by the founder in his first catalog: "For it is clear . . that, in the Natural Sciences, something more is needed than simple textbooks and oral teaching. Visible, tangible objects alone meet this necessity, and give the student clear and correct views." The present Establishment stands as a living monument to the wisdom, the energy, enthusiasm, and driving force of Henry A. Ward.

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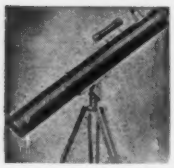

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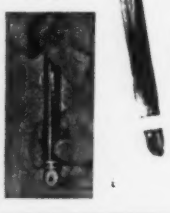

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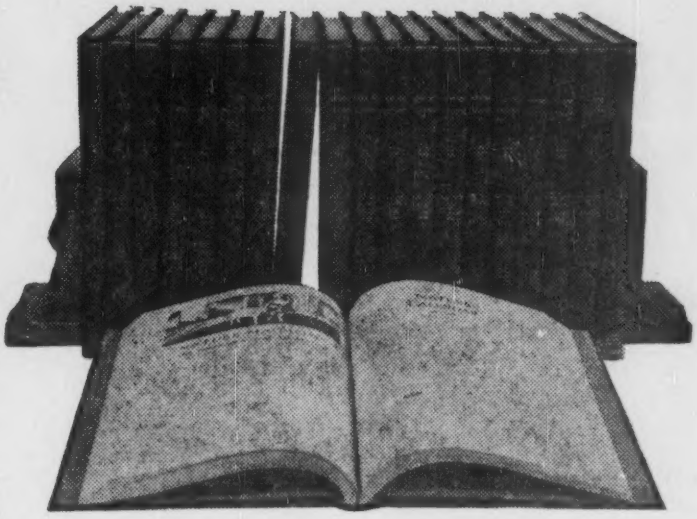

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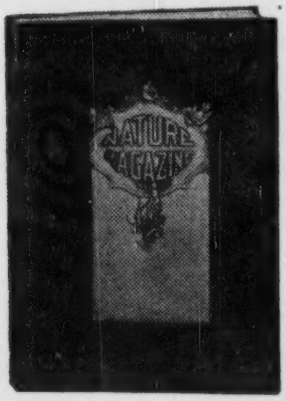

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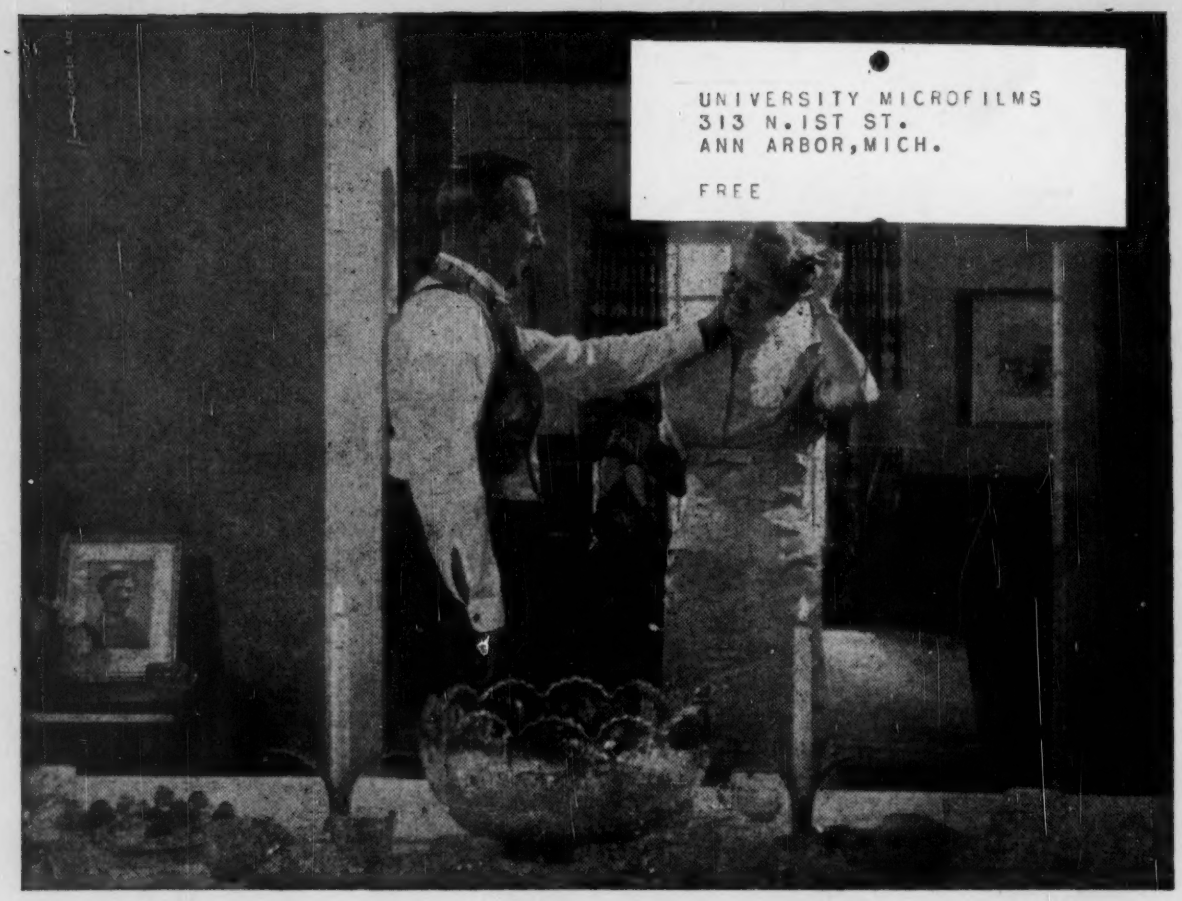

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